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ABSTRACT

Water Cycle is one of the units of a K-6 unified science curriculum program. The unit consists of four organizing sub-themes: (1) atmosphere (highlighting the processes of evaporation, condensation, convection, wind movement and air pollution); (2) water (examining the properties of liquids, water distribution, use, and quality, and the water cycle); (3) oceans (investigating the physical features, life forms, resources, and locations of the oceans); and (4) weather (addressing the topics of clouds, winds, climate, and seasonal change). Each sub-theme contains an introductory statement, student activities for lower primary grades (K-3) and upper primary grades (4-6), and a teacher's copy for each student worksheet. Student worksheets are ready for duplicating. (ML)

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WATER CYCLE
ATMOSPHERE

The atmosphere is divided into 5 layers: the troposhere; stratosphere, mesosphere, thermosphere and exosphere. These layers and how they control the weather and transmission of waves, such as radio waves, are subjects for junior high and high school level. For elementary school students, however, the atmosphere unit should introduce the composition of air, how the changing states of matter control weather formation, how air moves and why the atmosphere is so important to humans. The troposphere is basically where most of the weather occurs, and hence the part of the atmosphere most readily understandable by elementary school students. Air, heated by the sun, rises and is replaced by colder air. These currents create winds which move clouds created by evaporation of water masses.

LOWER PRIMARY

A. **CAN STATES OF MATTER CHANGE?** - How does water become clouds? What is evaporation? What is dew? What is frost? Why is water so important in making weather?

B. **WHAT IS IN THE AIR?** - What elements are in the air? What compounds are in the air? Why can we not see air? Is air a substance? Does all levels of the atmosphere contain the same ingredients?

UPPER PRIMARY

C. **HOW DOES THE AIR MOVE?** - What is convection? What creates wind? Does the spinning of the earth influence the wind? Can mountains get into the way of wind? What direction does wind move? Can wind move its direction easily?

D. **WHY IS THE ATMOPSHERE IMPORTANT?** - What would happen if the composition of the gases changes? What contributes to the gases in the atmosphere? What can change these gases? Can the atmosphere get dirty? What is acid rain? Can humans die if the atmosphere changes?

SE 046 350

K - 6 Science Curriculum

Joint Project by Math Science Nucleus and U.S. Geological Survey

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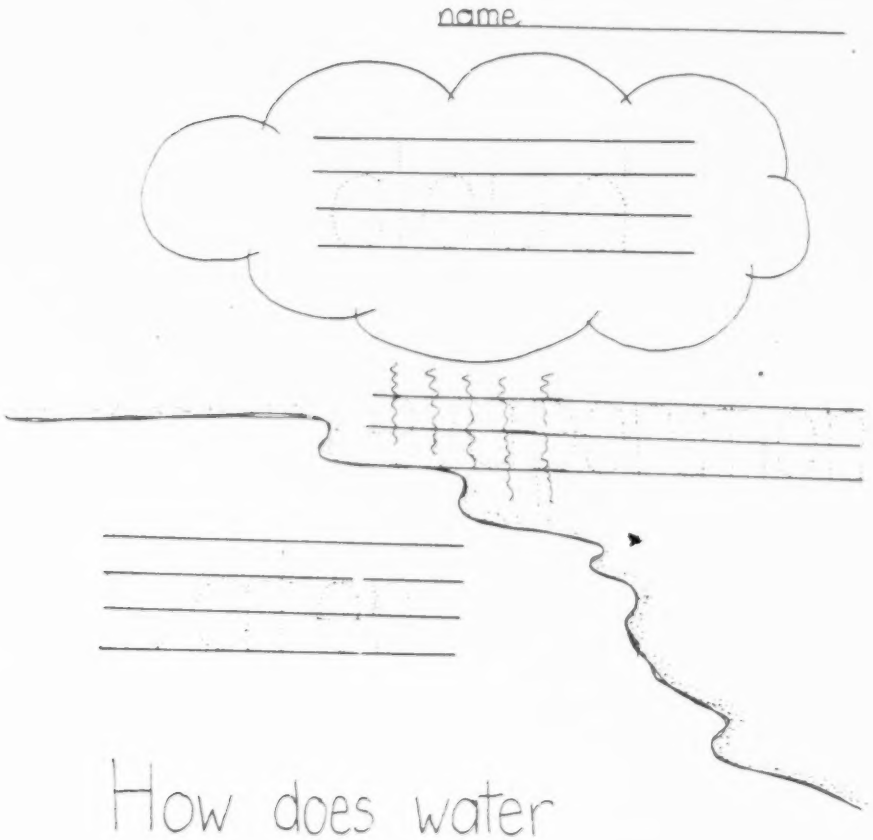
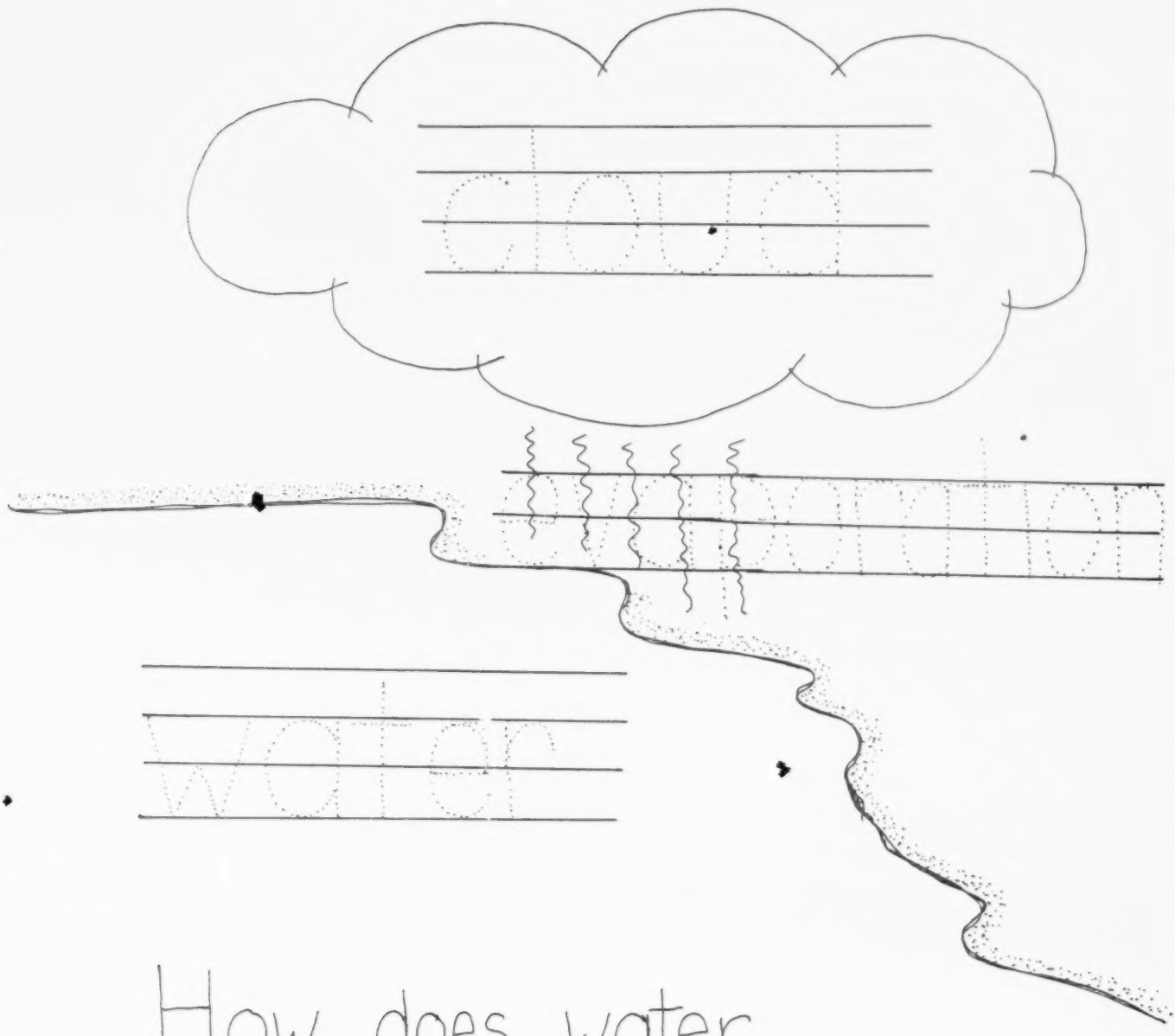
TEACHER SHEET
KINDERGARTEN - ATMOSPHERE

This coloring and handwriting exercise illustrates that clouds comes from water. Evaporation or the process involved in changing water from the liquid state to a gaseous state is very important here. Stress with your children that clouds are just another state in which water can change into. This explains also why clouds produce rain and snow, and not cats and dogs.



name _____

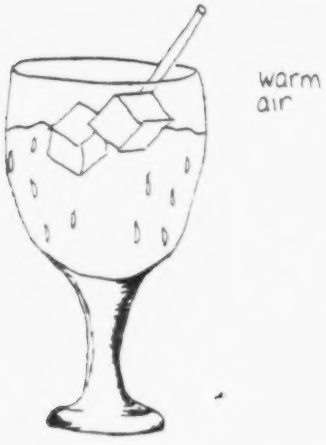


How does water become clouds?

TEACHER SHEET
FIRST GRADE - ATMOSPHERE

Most children are familiar with a glass of a cold liquid sweating on a hot day. If they are not, this experiment is easy to demonstrate. You can introduce the term "condensation," which is what this "sweat" is called. This process produces dew. Emphasize that dew does not fall. It is just water vapor that becomes liquid on a solid surface that have been cooled below a certain temperature. This cooling usually happens during a clear, cool night, but disappears once the morning sun evaporates the dew. Frost is formed like dew, but at temperatures below freezing. The water vapor changes directly to small, fine frost crystals without condensing into water drops first.

name _____



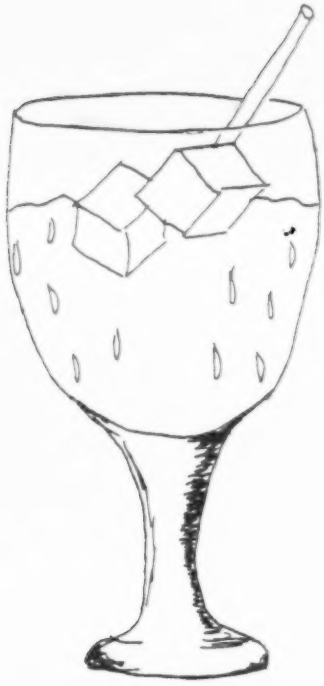
Why does a cold glass of lemonade "sweat" when it is a hot day? This is called dew. _____

_____

_____

_____

name _____



warm
air

Why does a cold glass of lemonade "sweat" when it is a hot day? This is called dew. _____

_____

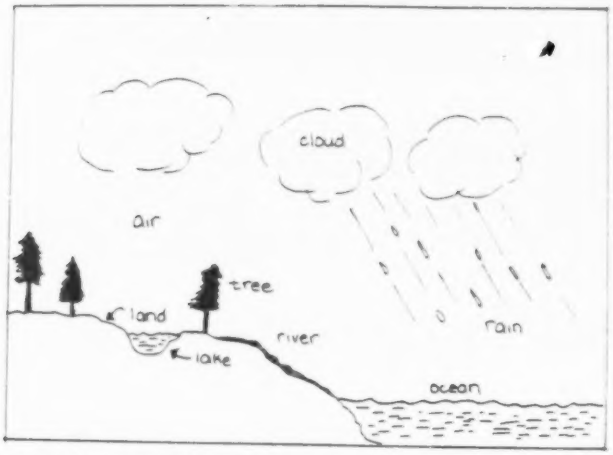
_____

_____

TEACHER SHEET
SECOND GRADE - ATMOSPHERE

Water can change very easily into the three states of matter: liquid, solid and gas. Have your children list the items written on the picture and have them decide whether it is liquid, solid or a gas.

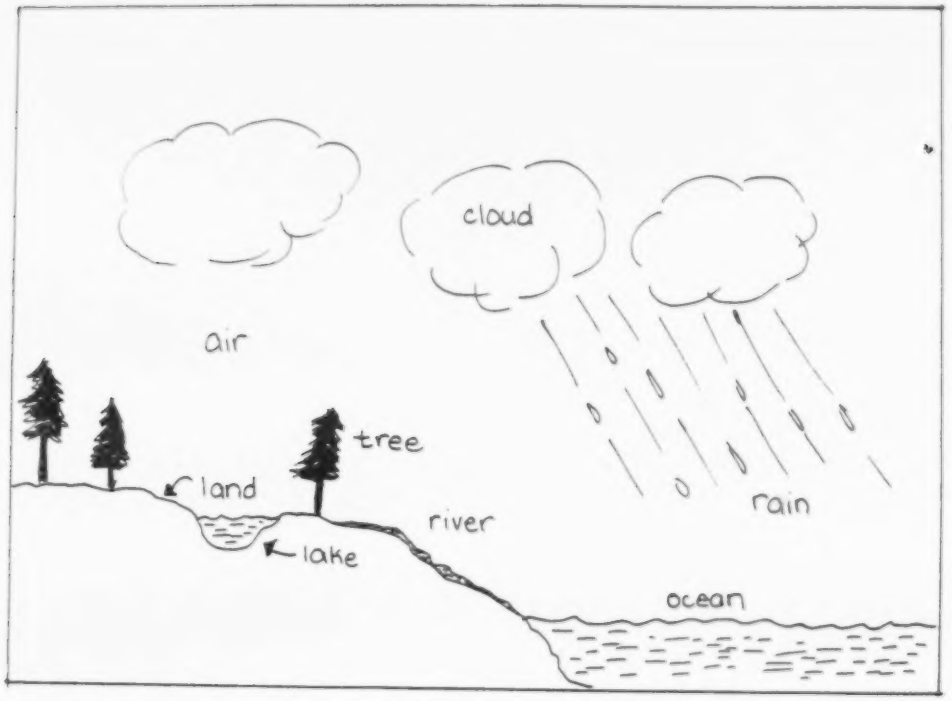
name _____



List the items above and state whether they are a solid, liquid or gas

cloud - gas / part solid
air - gas
land - solid
lake - liquid
river - liquid
rain - liquid
ocean - liquid
tree - solid

name:

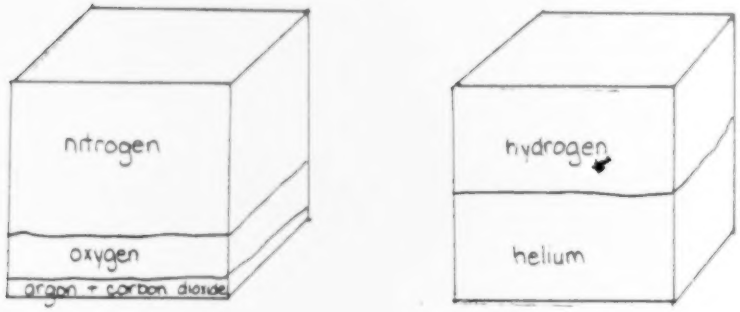


List the items above and state whether they are a solid, liquid or gas.

TEACHER SHEET
THIRD GRADE - ATMOSPHERE

Air consists of mainly gases in different proportions, depending on how high you are in the atmosphere. This exercise shows two different areas in the atmosphere, and the students must decide where they belong. You may want to give them a clue, that one of the elements is essential to humans, so it must be closer to the earth. Also ask them, if they were traveling in an airplane would there be more oxygen up there...if not, how can they breathe in the airplane? (Oxygen comes contained inside the plane). If they were climbing a tall mountain, would they have trouble breathing? (Yes).

Main ingredients of air



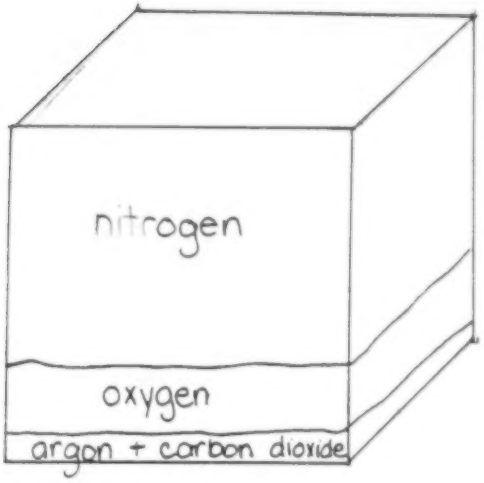
A B

Use a periodic table to find the symbols for each of the gases in air. List the ingredients and write the symbol.

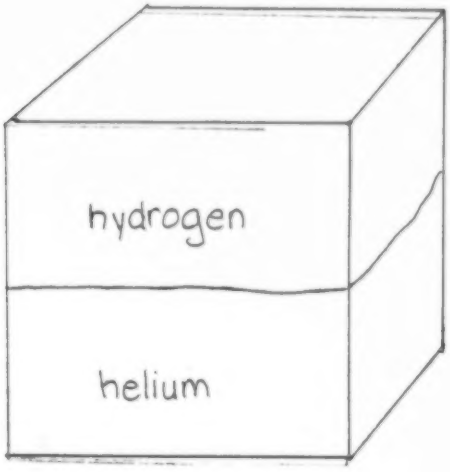
nitrogen = N
oxygen = O
argon = Ar
carbon dioxide = CO_2
hydrogen = H
hellium = He

Which composition of air do you think is found
below 45 miles? A
above 500 miles? B
Why? B has lighter gases

Main ingredients of air



A



B

Use a periodic table to find the symbols for each of the gases in air. List the ingredients and write the symbol.

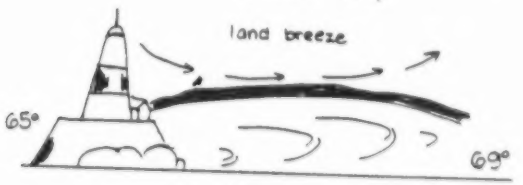
Which composition of air do you think is found
below 45 miles? _____
above 500 miles? _____
Why? _____

TEACHER SHEET
FOURTH GRADE - ATMOSPHERE

In this exercise the children should notice that there is a difference in temperature over the land and water, and that this difference changes from day to night. The sun beating down on the coastal land heats it and the air over it, more than it heates the ocean and its overlying air. Circulation is started in which a "sea breeze" of cool air sweeps in from the ocean, pushing up the air warmed by the land which then rises and streams out aloft toward the ocean. At night, the land loses its heat more rapidly than the water. The air above it is chilled, while the ocean air is relatively warm. The colder air now sweeps from the land to the water, producing the "land breeze."

name _____

Summer day



Summer night

Here are the facts! During a summer day, wind blows from the water to land; during night, wind blows from land to water Why do you think this happens?

name _____

Summer day

Summer night

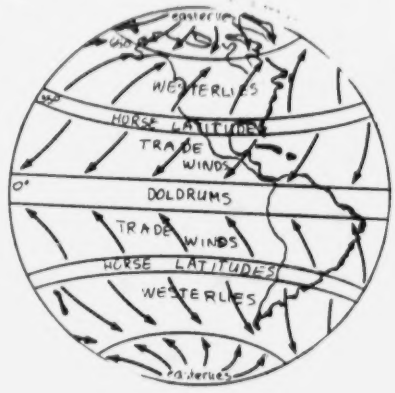
Here are the facts! During a summer day, wind blows from the water to land; during night, wind blows from land to water. Why do you think this happens?

TEACHER SHEET
FIFTH GRADE - ATMOSPHERE

This exercise illustrates the Coriolis Effect which is difficult to understand. The earth is spinning, and this spinning affects the wind. Examples for the students include, a turning record...a particle will move on it with a curved path; and on a merry-go-round....the ball with move with an apparent curved motion to the friend. The end product is that a mass that is spinning will produce a curved movement, which happens to the wind patterns, as illustrated below. However, if the earth was not spinning, solar radiation on the equator will cause one side to heat up, and the other side to be cold. Convection currents from hot to cold would develop.

name _____

How would air circulate if the earth did not spin on its axis? Draw it below. (Hint: Hot air rises, cold air descends).



How can the rotation of the earth change this pattern? (Hint: What happens when you put something on a record when it is moving on the turntable or when you throw something to a friend on a merry-go-round?)

Spinning changes wind

name _____

How would air circulate if the earth did not spin on its axis? Draw it below. (Hint: Hot air rises, cold air descends).

How can the rotation of the earth change this pattern? (Hint: What happens when you put something on a record when it is moving on the turntable or when you throw something to a friend on a merry-go-round?)

TEACHER SHEET
SIXTH GRADE - ATMOSPHERE

The students should pick up that without oxygen we would all die. The plants will die because there would be no carbon dioxide. The only creatures that might survive are organisms that require no oxygen...which there are a few. These organisms however are mainly bacteria which rely on sulfur for their energy. There is really no right or wrong answer here, the main point is to teach the importance of our atmosphere.

Before

... and after

name _____

What would happen if we didn't have an atmosphere? Create and write a story about a planet that loses its atmosphere very slowly. Make sure you explain what will die out first and state what you think will remain.

Before

name _____

.... and after....

What would happen if we didn't have an atmosphere? Create and write a story about a planet that loses its atmosphere very slowly. Make sure you explain what will die out first and state what you think will remain.

WATER CYCLE
WATER

Water is a transparent, odorless, tasteless liquid composed of hydrogen and oxygen. It is a very good solvent, meaning that many substances can dissolve in it easily. Water is important to all our lives; without it we could not live. There are basically no living creatures that can live without it. Water on this planet is basically from gases that were emitted from volcanoes, a long time ago. Our atmosphere has captured this water and continuously recycles it, in what is called the water cycle. Water evaporates and forms clouds, the clouds provide rain and snow, which collect in rivers, lakes, underground reservoirs or oceans that is the source for further evaporation. Water is a perfect compound for this to occur because it boils at a high temperature (212 degrees F./ 100 degrees C.) and freezes at (32 degrees F./ 0 degrees C.). Water can easily evaporate and precipitate. Water also erodes the land, which breaks up the rocks which add minerals to create oceans that contain salts and other ingredients.

LOWER PRIMARY

A. WHAT IS A LIQUID? - Do all wet substances have to be liquids? What are properties of liquids? How do liquids differ from solids and gases? What are examples of liquids?

B. WHAT IS WATER? - Why do we need water? What needs water to live? Where is water located? Are we really a water planet more than an earth planet?

C. WATER CYCLE - What is precipitation? What is evaporation? Where does water originate from? How does water move from one place to another?

UPPER PRIMARY

D. WHY ARE OCEANS SALTY? - What is the difference between fresh water and salt water? What is in salt water? Where does the salt come from?

E. WHY IS WATER IMPORTANT? - What is a drought? What industries depend on water? Can we drink dirty water? What would happen if we didn't have clean water to drink?

TEACHER SHEET
KINDERGARTEN - WATER

Students should be acquainted with the properties of a liquid. A liquid can be more than just water...emphasize with your children that even substances like rock can become melted and act as a liquid. Wetness or coldness does not characterize all liquids only that a liquid if a fluid that flows when poured.

name

What is a liquid?

flows

pours

fluid

melts

name

What is a liquid?

flows

pours

fluid

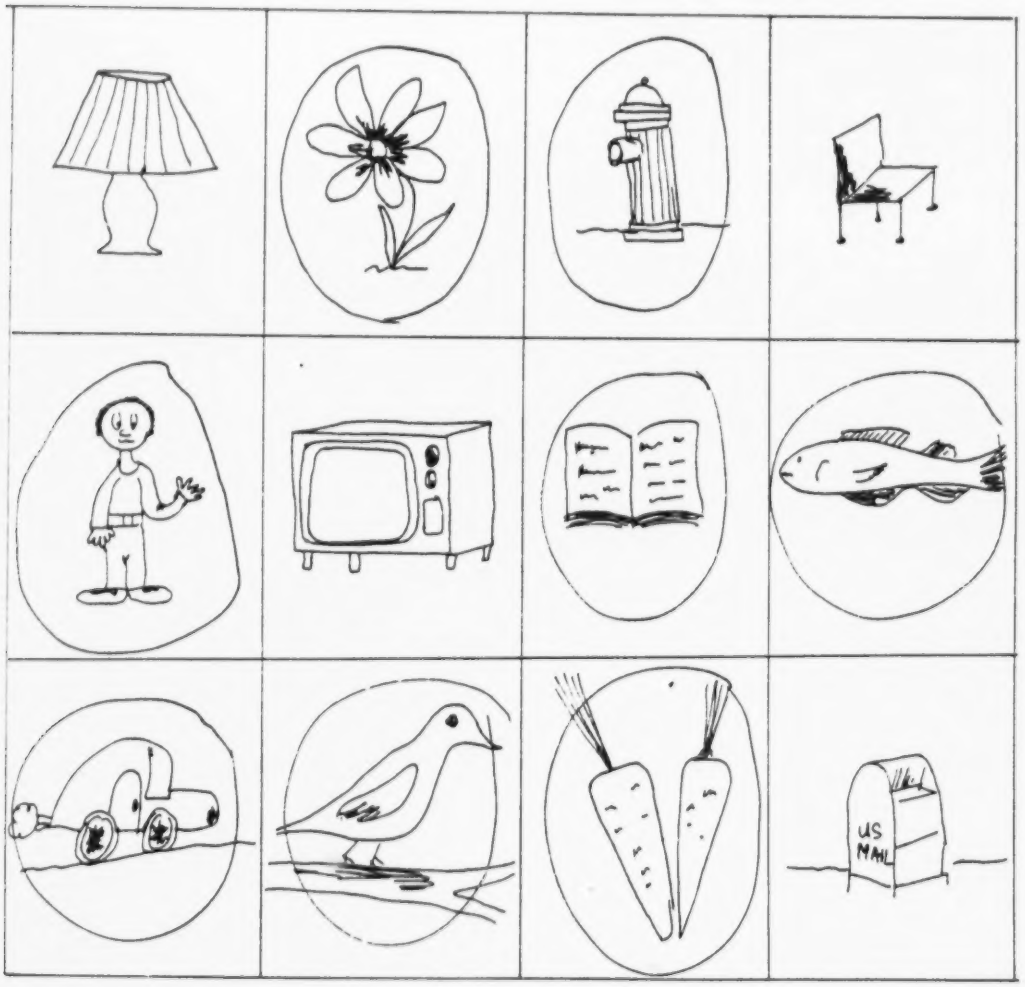
melts

TEACHER SHEET
FIRST GRADE - WATER

Most items need water. Some of the items on this sheet may not be familiar to students. A book needs water because the process of becoming paper from wood relies heavily on water. Also, a car needs water to keep it cool using a radiator.

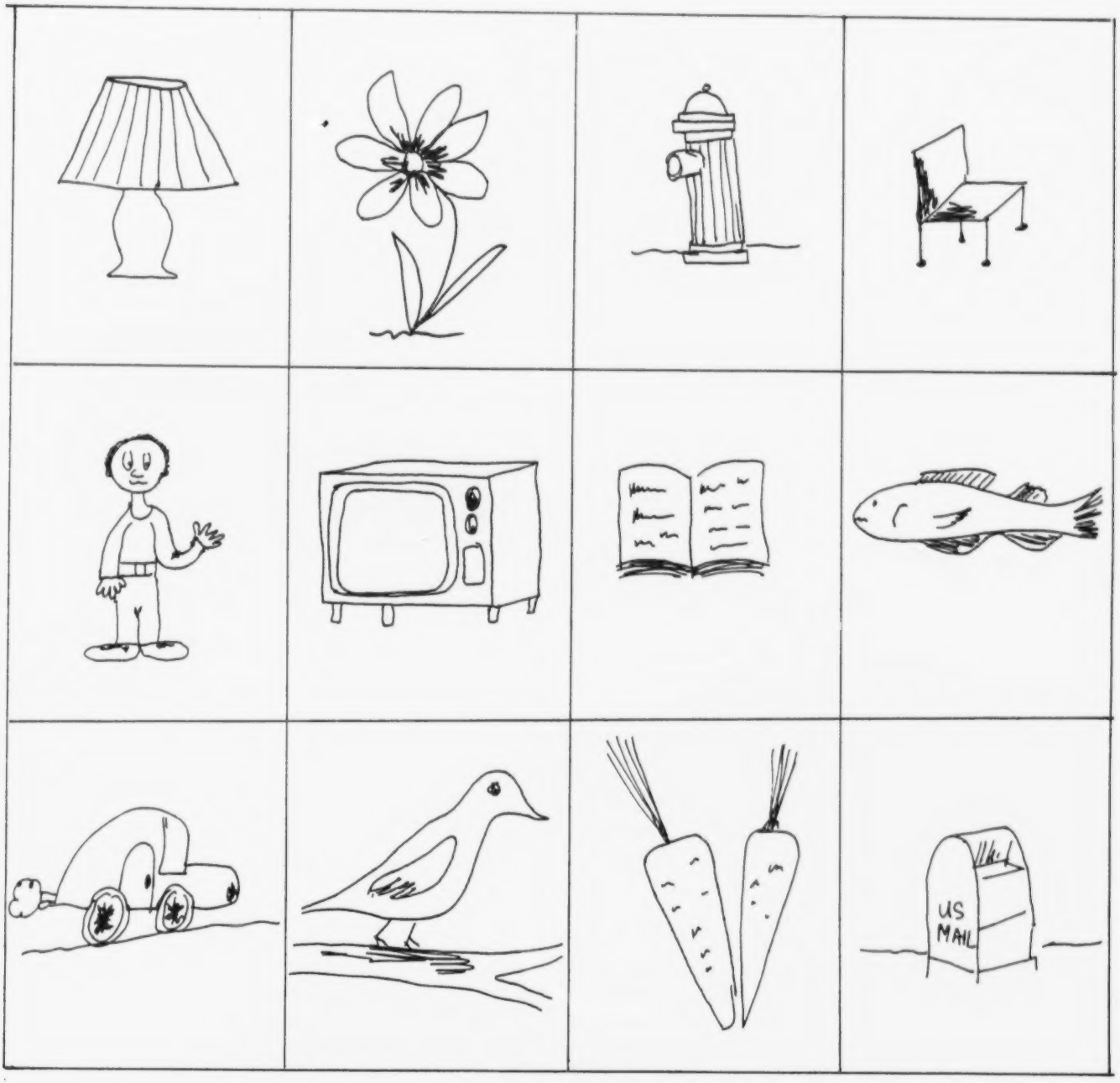
name _____

Circle the items that need water.



name _____

Circle the items that need water.



TEACHER SHEET
SECOND GRADE - WATER

Have your students taste, smell, hear, see and touch water. The item that you may have to explain is taste become most municipal water has been treated and has minerals in it like calcium, magnesium, etc. that may give the water a slight taste. Have the students compare distilled water (can purchase in a grocey store) with tap water. They should be able to taste the difference.

name _____

Describe water.

taste no taste

smell no smell

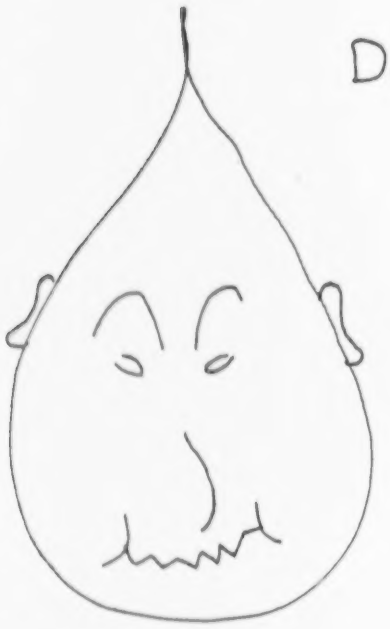
hear pouring sound

see no shape

touch wet

name _____

Describe water.



taste _____

smell _____

hear _____

see _____

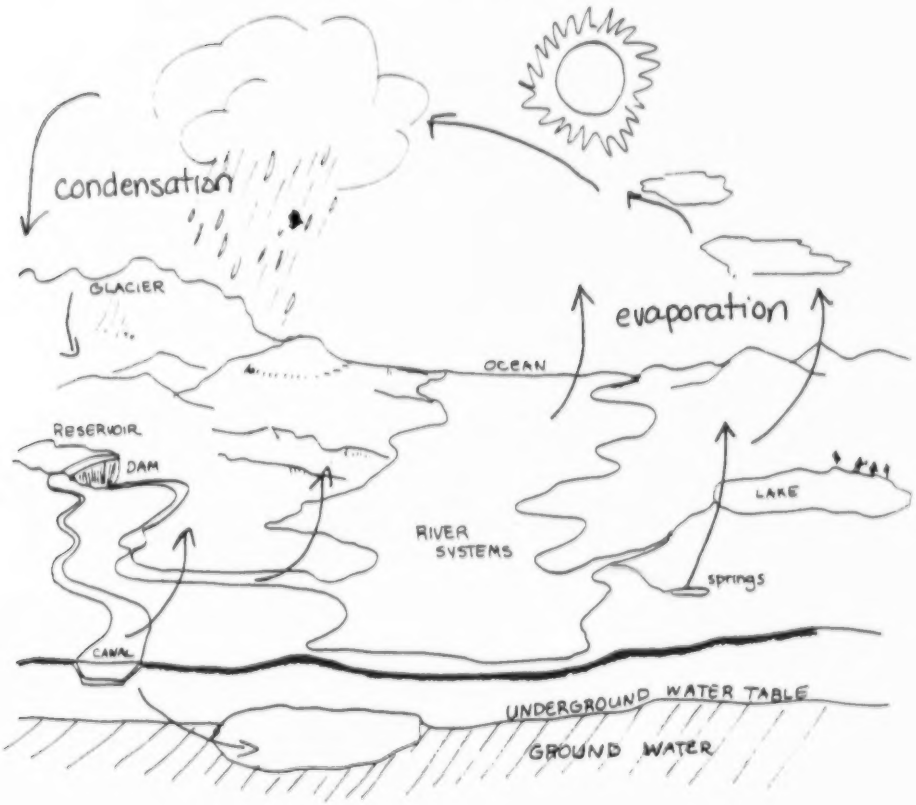
touch _____

TEACHER SHEET
THIRD GRADE - WATER

This exercise is to get the students familiar with the water cycle. The idea here is have them notice the various places where water can be stored and generated. Ask your students if they think that snow produces more or less water...they may be amazed that 10 inches of snow is required for 1 inch of rain! Have them notice that some water is trapped under the earth and emerges as springs. In this diagram, man-made features are illustrated to capture some of "mother nature."

name_____

Show the movement of water by using an arrow to show direction. You have created the water cycle! Label evaporation and condensation.



name _____

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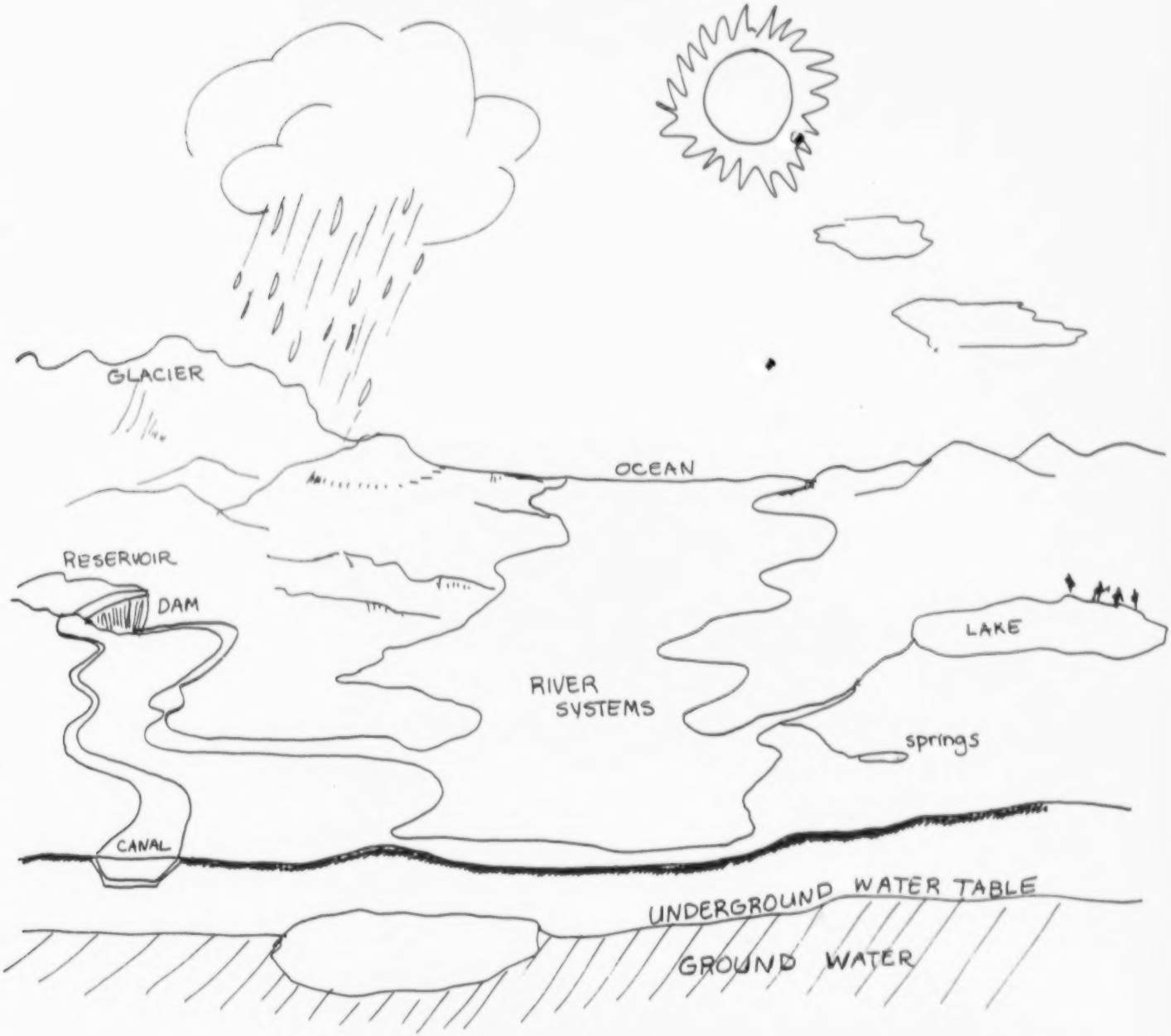


TEACHER SHEET
FOURTH GRADE - WATER

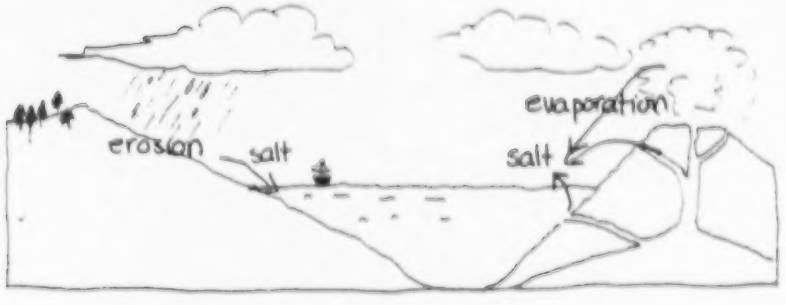
Two parts of the hydrologic cycle play major roles in this exercise - run-off (both subsurface and above ground) and evaporation. Other influences include the saltiness of the oceans are the solid and gaseous ejections from volcanoes. Almost every common mineral is dissolved into seawater including gold and silver. The amount of "salts" dissolved in water is alot, but because this earth is covered by so much water, their concentration is diluted.

name _____

Do clouds have salt in them? no Why?
only fresh water can evaporate into gas

Are there any areas that have salt water other than the oceans? Name them Yes,
Great Salt Lake, Utah
Black Sea, Russia

Salt water is made during the movement of water. The diagram below shows areas where salt is added to the water cycle. Label evaporation, erosion, source of salts



remember: salts does not just refer to table salt

name _____

Do clouds have salt in them? _____ Why?

_____

_____

Are there any areas that have salt water other than the oceans? Name them. _____

_____

_____

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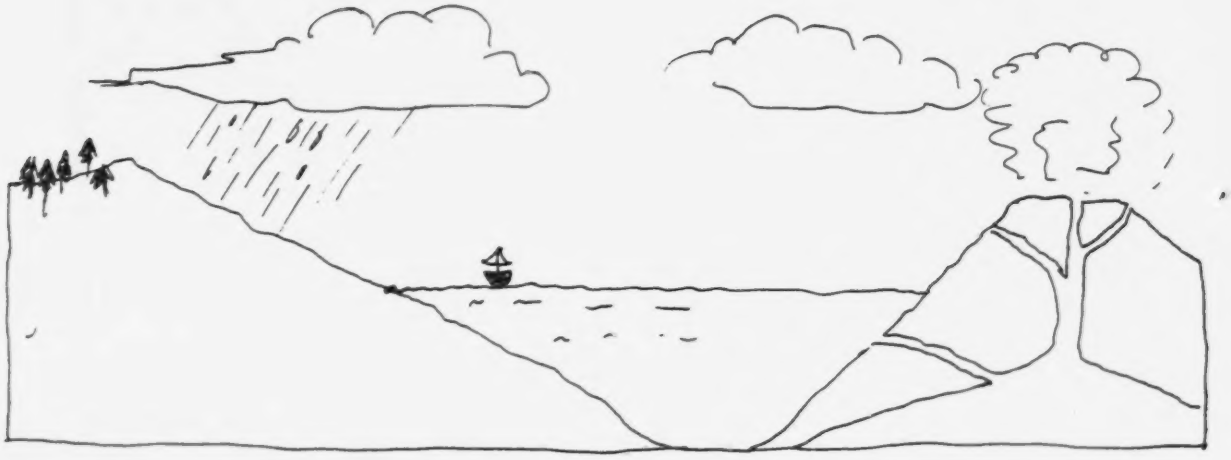


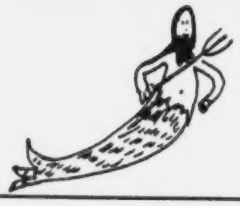
remember: salts does not just refer to table salt

TEACHER SHEET
FIFTH GRADE - WATER

The oceans, rivers and lakes were very important to ancient civilizations. The water provided food, salt, transportation and drinking supplies. Ancients needed to live near the water because of this importance. The Romans and Greeks also feared the oceans because it sometimes did unpredictable things. Ships would sink or get lost, children could drown, rain would not come to water the crops, and other horrible things. They didn't understand the powers of the oceans and rivers, but they knew they were powerful. Hence, they named and honored the waters with a powerful god figure.

name

The God of the Sea (Neptune of the Romans, Poseidon of the Greeks), was a powerful god. Why did these ancients feel that the person who controlled the sea was so important. Remember Ancient people relied on lakes, rivers and oceans for transportation, salt, food, and drinking. Write a story about what would happen if the God of the Sea would get mad?



name

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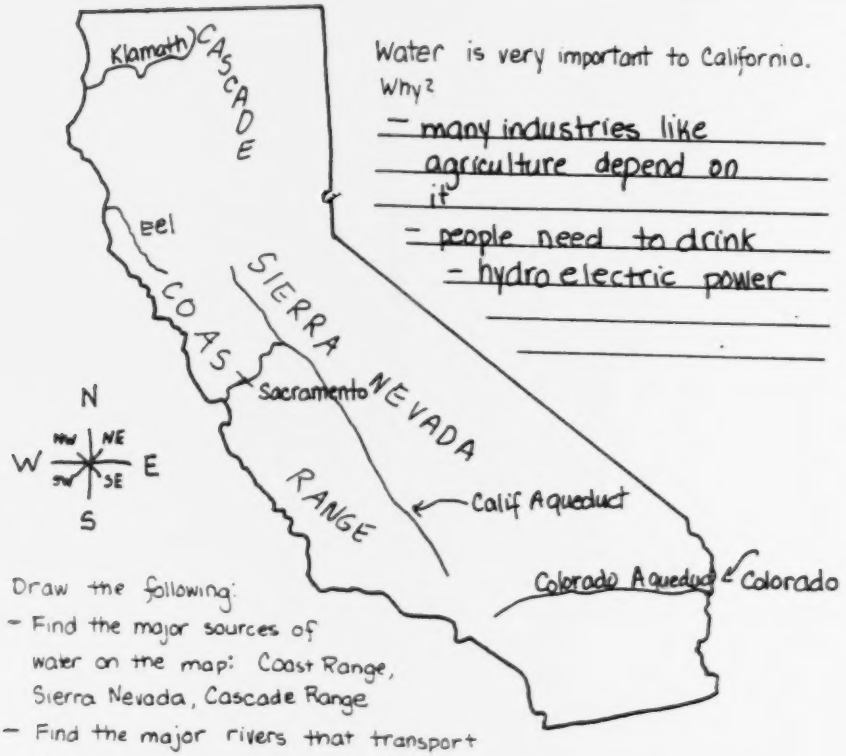
TEACHER SHEET
SIXTH GRADE - WATER

California's agricultural business is very dependant on water. Without it, the Central Valley, Sacramento Valley, and San Fernando Valley would not be the agricultural king that they now enjoy. California's fight for water is very important for this state. Especially when the distribution of water is so uneven. The northern part of the state is blessed with water, and the southern half is not. The southern part is always trying to enact laws to get some of the northern water. The California Aqueduct is one of these by-products. Also, the southern part of the state has "trapped" part of the Colorado River, which has created quite alot of trouble during the early 1900's.

name _____

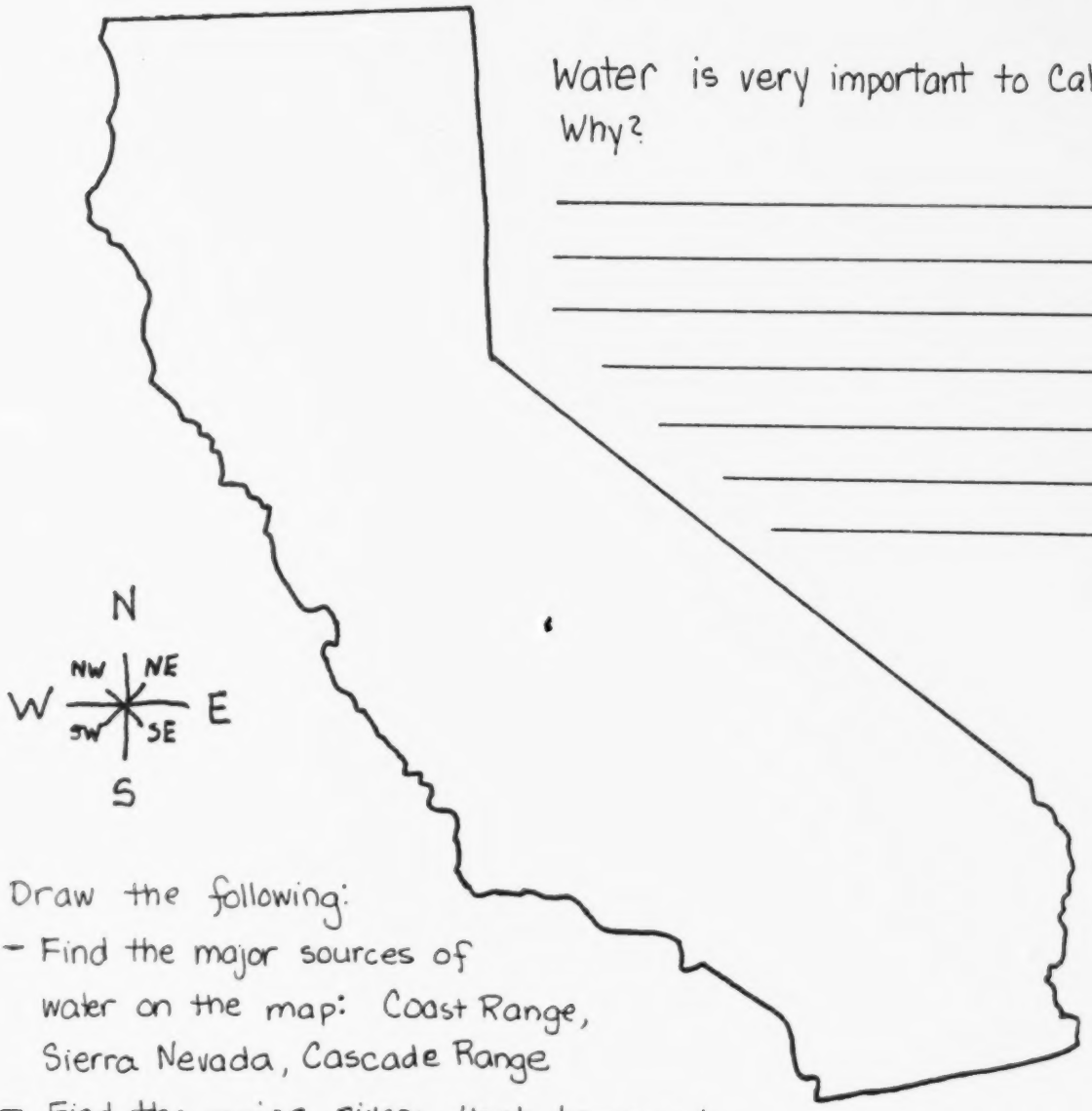


Water is very important to California.
Why?
- many industries like agriculture depend on it
- people need to drink
- hydro electric power

Draw the following:
- Find the major sources of water on the map: Coast Range, Sierra Nevada, Cascade Range
- Find the major rivers that transport these waters: Colorado River, Sacramento River, Klamath River Eel River
- Find the man-made aqueducts: California Aqueduct, Colorado Aqueduct
- What industries would fail in California, if we have a long term drought?

_____
_____
_____

name _____



Water is very important to California. Why?

_____

_____

_____

_____

_____

_____

_____

Draw the following:

- Find the major sources of water on the map: Coast Range, Sierra Nevada, Cascade Range
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- Find the man-made aqueducts: California Aqueduct, Colorado Aqueduct
- What industries would fail in California, if we have a long term drought?

_____

_____

_____

WATER CYCLE

OCEANS

The oceans has always been a symbol of fun and sun. Children love to play in the sand and watch the waves hit upon the shores. The interest that children have makes the subject easy to teach.

Students need to understand how large the oceans are and the impact on the weather. It is the oceans that provided easy transportation for the early explorers; food for early people and protection from enemies. Now the oceans are looked at for food, mineral, and oil resources. Research on the oceans is showing how important they are in the worldwide weather patterns, so understanding ocean movements is very important.

LOWER PRIMARY

A. WHERE ARE THE OCEANS? - How many oceans are there? What is the closest ocean to where I live?

B. HOW BIG ARE THE OCEANS? - How large is the oceans compared to land? Which ocean is the largest? Which ocean is the deepest? How many oceans are there?

C. WHAT IS IN THE OCEANS? - What animals live in the ocean? What plants live in the oceans? What does the bottom of the oceans look like? Why do icebergs float on the oceans? Why does the ocean taste salty? What are coral reefs?

UPPER PRIMARY

D. WHERE ARE THE MAJOR OCEANS? - What is the difference between an ocean and the sea? What are islands? Does the ocean floor change its shape? What is the difference between the oceans?

E. WHY IS THE OCEANS IMPORTANT? - Does the oceans have minerals or rocks that are important? Can fish provide protein for people? How does the oceans affect the weather? Why are estuaries and bays important to wildlife? Can we live without the oceans?

F. HOW DOES WATER MOVE? - Describe currents in the oceans. Why do currents move? Are currents just on the surface or do they go deep?

SONGS

Songs are loved by all children.

Songs are repeated and remembered.

Why not use songs to emphasize a subject.

The water, oceans, and seas have always brought to mind a sense of vastness, fear and wonder. Use these songs to emphasize how vast the oceans are and to introduce students to lands far away. Have the students try and figure where the songs come from. Locate on a map their answers. See if it makes sense and why.

The Library of Congress has a long playing album on American Sea Songs and Shanties (it isn't terribly good, but it comes with words). You can purchase it from Library of Congress, Recording Laboratory, Washington, DC 20540. Price is minimum, but write to find the exact price.

JOHN B

G
We came on the sloop John B

My grandfather and me

D7
Round Nassau town we did roam

G
Drinking all night

C
Got into a fight

D7 G
I feel so broke up I want to go home

Chorus: So hoist up the John B sails

See how the main sails set

Sent for the captain ashore

D7
Let me go home

G
Let me go home

C
Please let me go home

G D7 G
I feel so broke up I want to go home

The poor cook, oh he got fits
Ate up all the grits
Then he took and threw away all the corn
Sheriff Johnstone please let me alone
This is the worst ship I ever been on

Chorus

The first mate he got drunk
Broke up the people's trunk
Constable has to come and take him away
Sheriff Johnstone, please let me alone
I feel so broke up I want to go home.

THIS LAND IS YOUR LAND

G C
This land is your land
G
This land is my land
D7
From California to the New York Island
C
From the Redwood Forest to the
G D7
Gulf Stream water, This land was
G
made for you and me

As I went walking that ribbon of highway
I saw above me that endless skyway,
I saw below me that golden valley
This land was made for you and me

I roamed and rambled and followed my footsteps
To the sparkling sands of her golden desert
And all around me a voice was sounding
This land was made for you and me

When the sun come shining, then I was strolling
With the wheat fields waving and the dust clouds rolling
And voice was chanting as the fog was lifting
This land was made for you and me

DRUNKEN SAILOR

Am
What shall we do with the drunken sailor
G
What shall we do with the drunken sailor
Am
What shall we do with the drunken sailor
Em Am
Early in the morning?

Chorus: Yo ho and up she rises

Yo ho and up she rises

Yo ho and up she rises

Early in the morning

2. Put him in the long boat til he's sober
3. Pull out the plug and wet him all over
4. Heave him by the legs in a running bowline
5. Put him in the scuppers with the hose pipe on him
6. Shave him in the belly with a rusty razor

Teacher's Sheet - might want to point out the different oceans and that this in in the Southern hemisphere

name _____

Color the land brown.

Color the water blue.

name _____

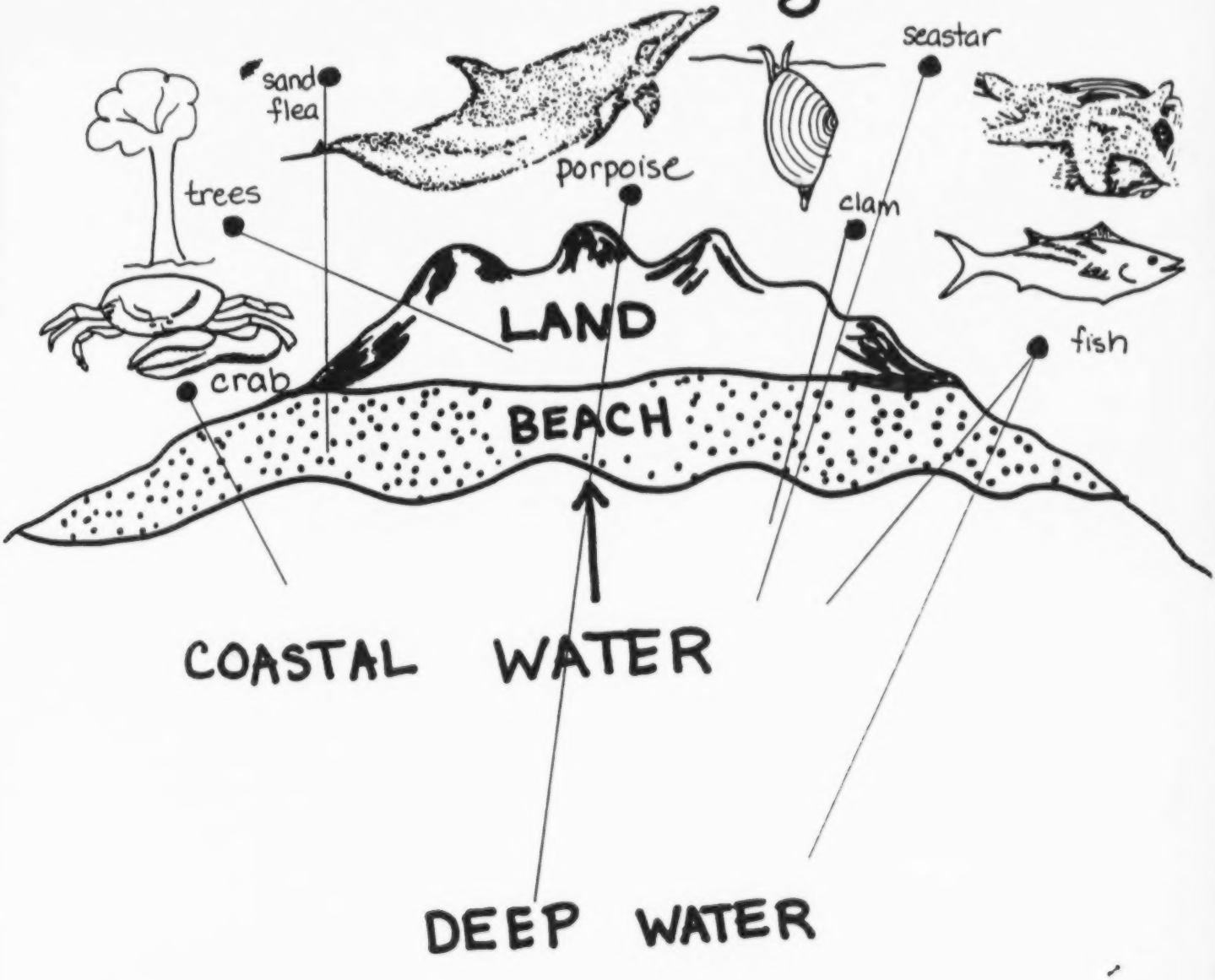
Color the land brown.

Color the water blue.

Teacher's Sheet

name _____

Where do these organisms live?

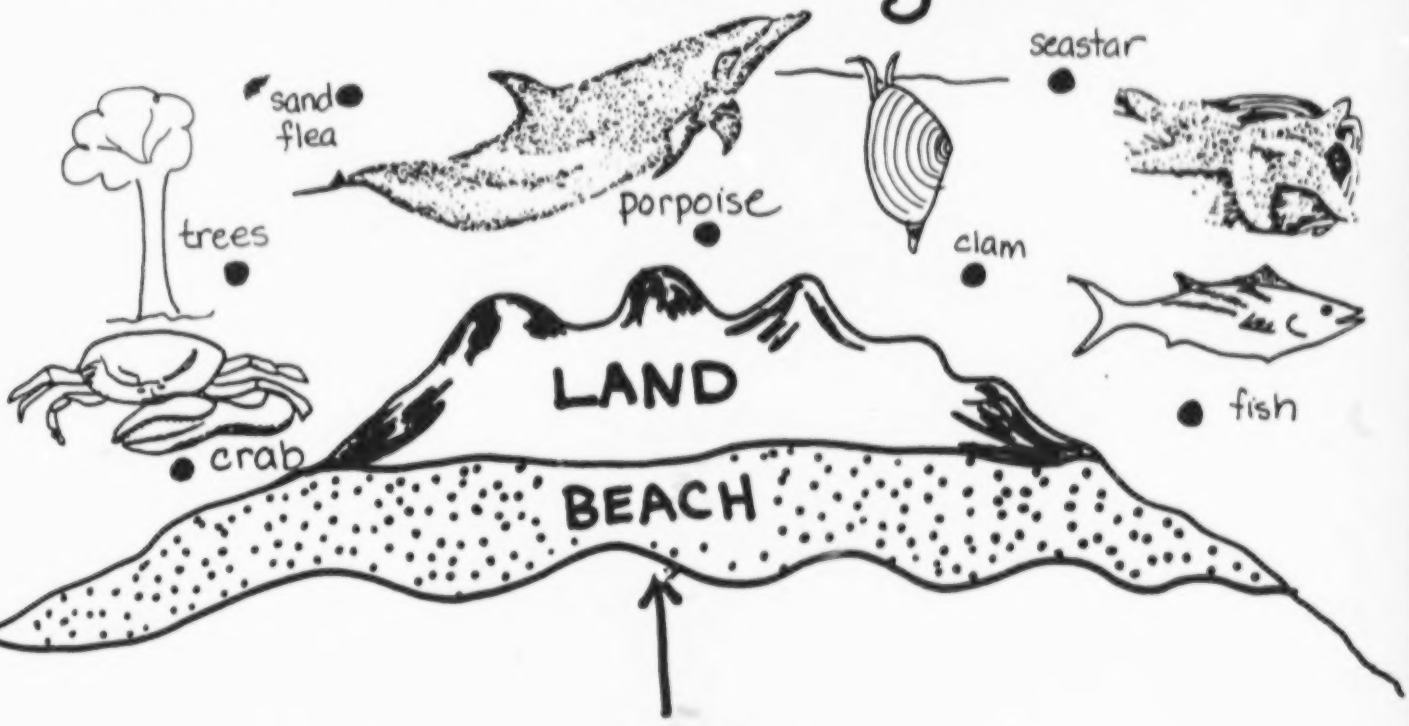


- get students to realize that organisms live in certain areas in the oceans, and that they use and add (ie eat other organisms, they poop[defecate])
- clarify that coastal waters is shallower than deep water

OCEAN FLOOR

name _____

Where do these organisms live?



COASTAL WATER

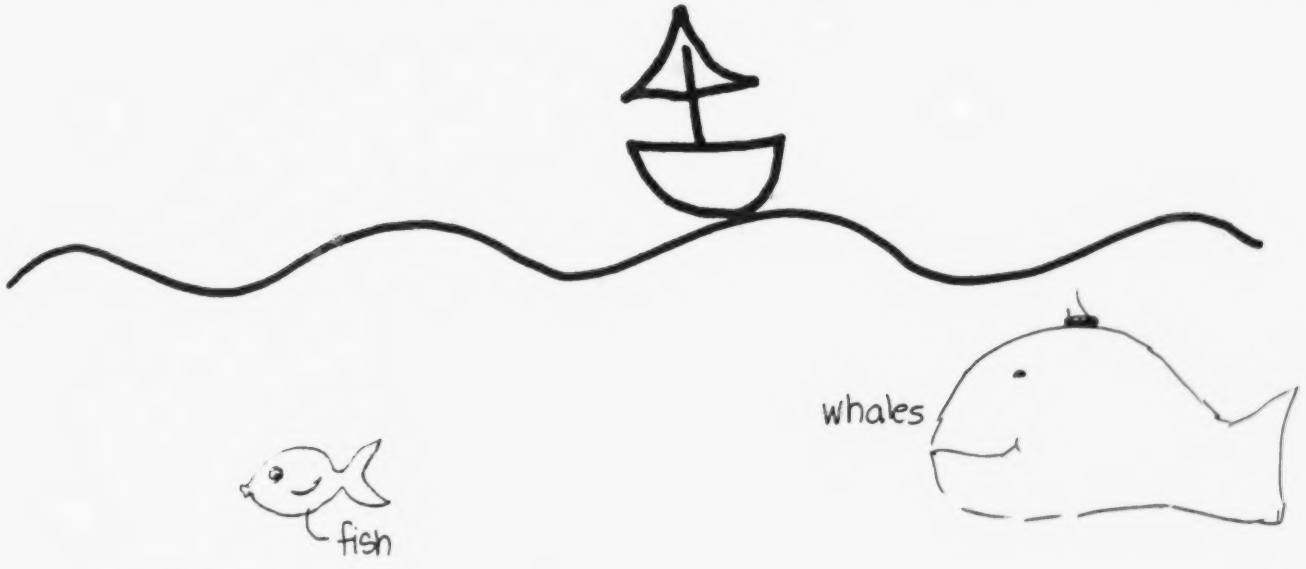
DEEP WATER

OCEAN FLOOR

Teacher's Sheet: students should draw pictures of different marine life, key point is to emphasize that the ocean bottoms is not flat.

name _____

What is under the oceans? Draw it.

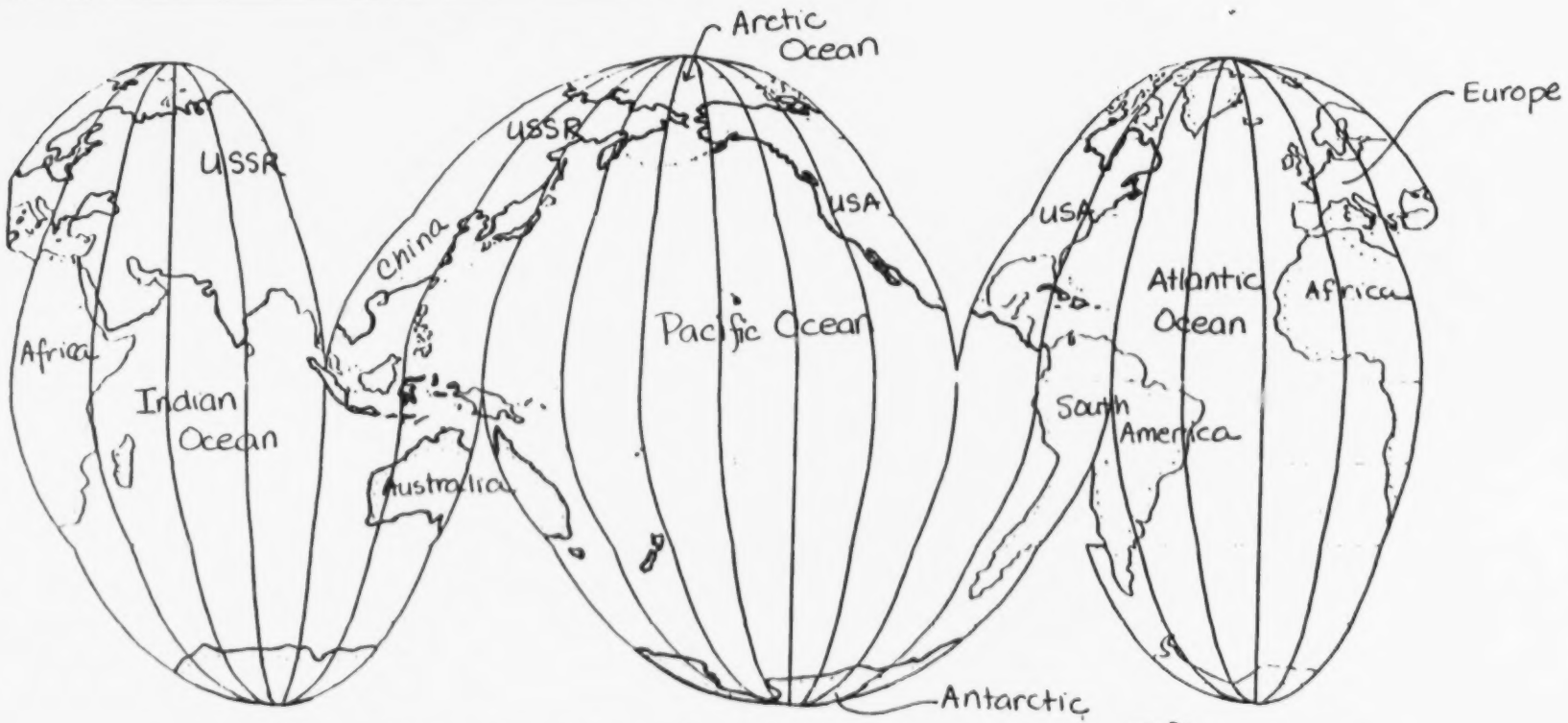


name _____

What is under the oceans? Draw it.

Teacher's Sheet

NAME _____



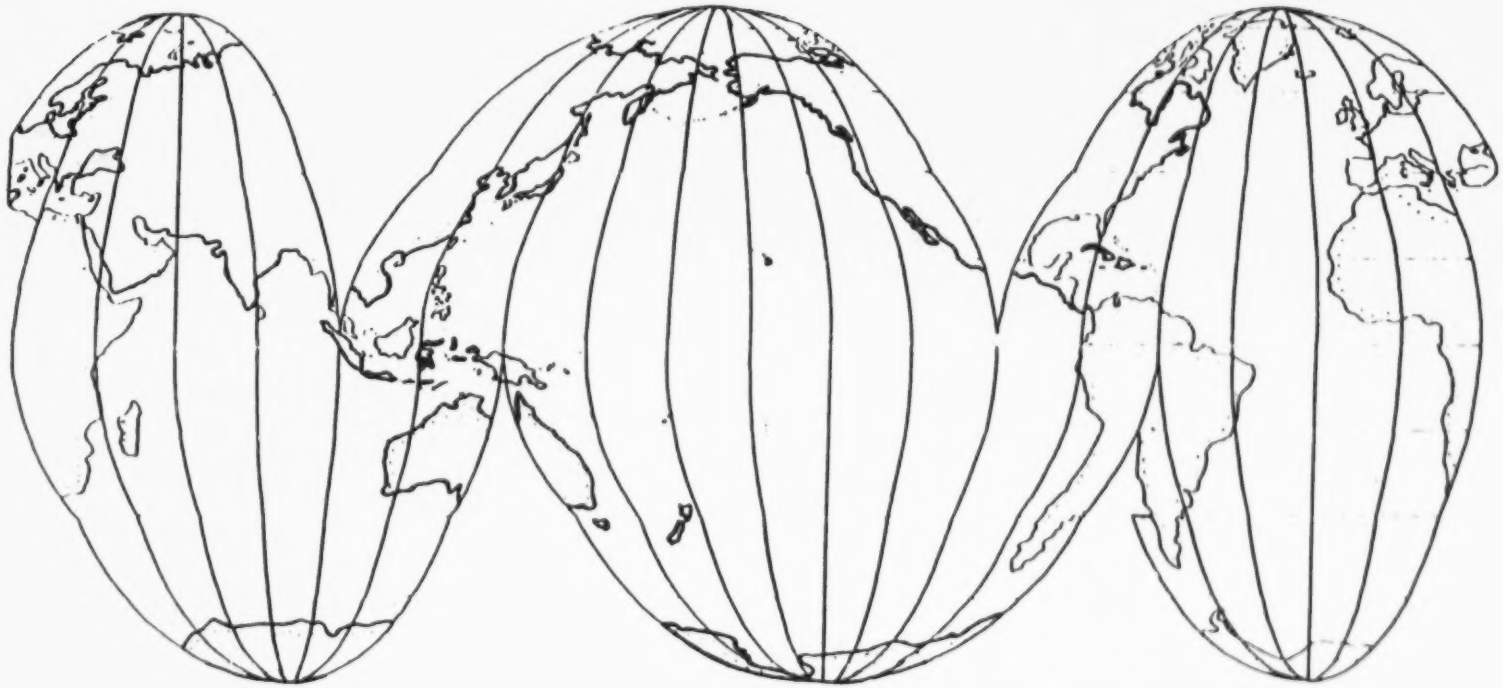
GUESS WHAT PERCENT OF THE WORLD IS MADE UP OF OCEANS? 71%

LABEL: PACIFIC OCEAN, ATLANTIC OCEAN, ARCTIC OCEAN, INDIAN OCEAN, ANTARCTIC, AFRICA, AUSTRALIA, CHINA, USSR, UNITED STATES, SOUTH AMERICA, EUROPE

WHY DOES THE MAP LOOK DIFFERENT THAN MOST MAPS YOU HAVE SEEN? _____

this is a different type of projection, that emphasizes the ocean

NAME_____



GUESS WHAT PERCENT OF THE WORLD IS MADE UP OF OCEANS? _____

LABEL: PACIFIC OCEAN, ATLANTIC OCEAN, ARCTIC OCEAN, INDIAN OCEAN, ANTARCTIC, AFRICA, AUSTRALIA, CHINA, USSR, UNITED STATES, SOUTH AMERICA, EUROPE

WHY DOES THE MAP LOOK DIFFERENT THAN MOST MAPS YOU HAVE SEEN? _____

_____

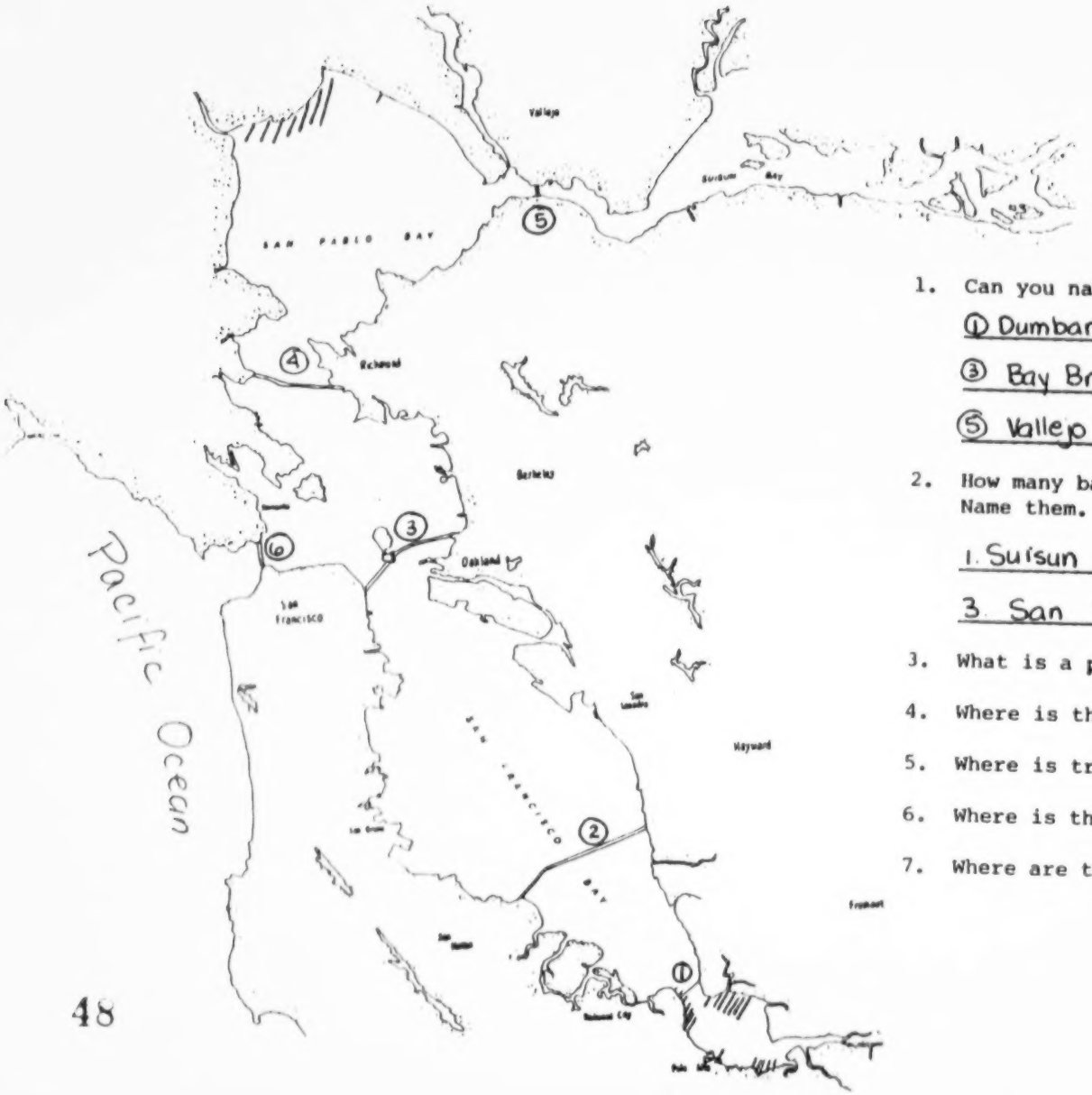
WHY SAN FRANCISCO BAY IS IMPORTANT TO ORGANISMS

The waters of the San Francisco Bay is a mixture of the salt water flowing in from the Pacific Ocean and the fresh water rivers that feed into the bay. The water in the bay is neither salty nor fresh, but brackish. This entire system is known as an estuary. The San Francisco esturine system is made up of three bays: San Francisco Bay in the south and the San Pablo and Suisun Bays in the north.

The San Francisco estuarine system is a very productive area. It is important in the entire ecosytem of the western United States. Many organisms depend on the bay for its food, safety and home. Migrating birds need to rest here on their trip to warmer climates and nesting for their young. The animals in the estuarine system are varied. Mammals, birds, reptiles, amphibians, invertebrates, protozoa and fish are all components of this system. The sysstem has many parts because of the need of the larger animals to feed on the smaller animals. This process is called the food chain and give us clues of why animals eat and live where they do.

The San Francisco Bay evaporates in ponds and produces salt for the commerical market.

NAME _____



1. Can you name the six bridges?

① Dumbarton Bridge ② San Mateo Bridge

③ Bay Bridge ④ Richmond Bridge

⑤ Vallejo Bridge ⑥ Golden Gate

2. How many bays can you find?
Name them. Which is the largest

1. Suisun 2. San Pablo

3. San Francisco (largest)

3. What is a peninsula? Is there one on this map?

4. Where is there brackish water? bays

5. Where is true ocean water? Pacific Ocean

6. Where is there fresh water? Sacramento River

7. Where are there salt marshes? ////

NAME _____

1. Can you name the six bridges?

   _____

   _____

   _____

2. How many bays can you find?
   Name them. Which is the largest

   _____

   _____

3. What is a peninsula? Is there one on this map?

4. Where is there brackish water?

5. Where is true ocean water?

6. Where is there fresh water?

7. Where are there salt marshes?

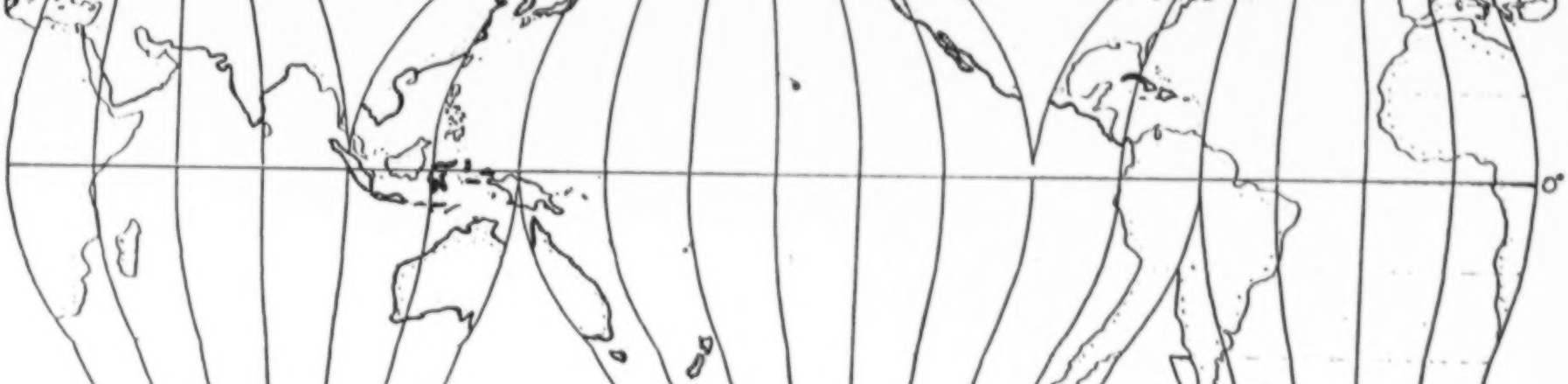
CIRCULATION PATTERNS

This exercise introduces students to the movement of surface waters in the oceans. If they get a basic understanding that the oceans do not just "sit" there, you have accomplished alot.

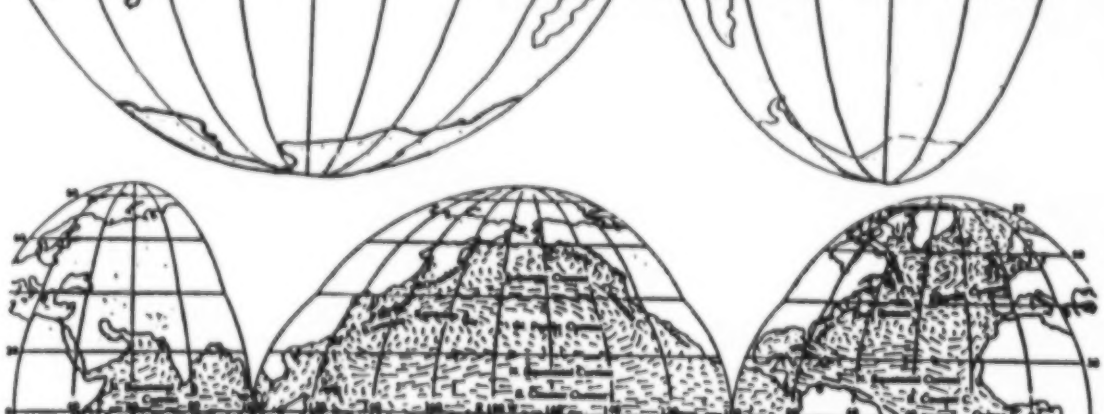
Have students try and simplify the surface currents on the blank map. Tell them to substitute a larger arrow for several of the smaller ones. Although this is a tedious process, it gets them into learning about their movement. Make sure they do this in pencil...there will be lots of erasing. You can make a transparency, project it on the blackboard and simplify it with the students.

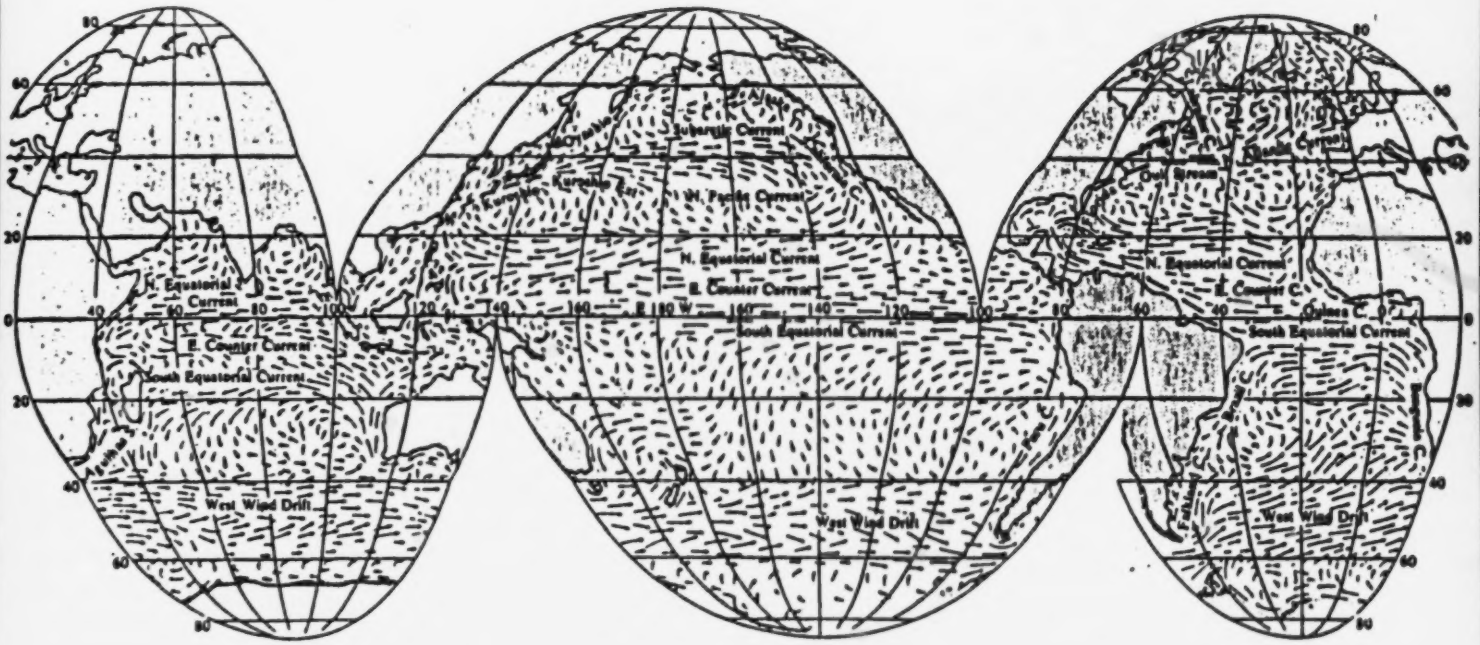
Someone in your class will probably ask "What makes the currents move?" At the elementary school level you can answer simply that the movement of the earth, as it spins around on its axis while orbiting the sun creates movement. Added complications to the currents include: a) wind b) differences in height of the water (ie the Atlantic Ocean is higher than the Pacific Ocean near the Panama Canal) and c) topography. There are several other factors, but at this stage in the game, don't worry about it.

name _____



Surface Currents of the Oceans





BEST COPY AVAILABLE

WATER CYCLE

WEATHER

Weather is all around us. Children learn early that their lifestyle is affected by the changing weather. What clothes do they wear to play outside, is one of their first observations of the real world outside their home. Children record whether the weather is hot, cold, warm, cool, wet, or dry...but usually do not realize why the weather changes. There are several key concepts that need to be developed in studying the weather. (1) Long term weather gives a region it's climate. (2) Weather is controlled by solar heating of our planet. (3) The spinning of our earth effects how warm and cold masses are moved by wind. (4) Seasons are caused by the tilt in the earth's axis. (5) Weather and climatic patterns are very complex.

LOWER PRIMARY

A. WHAT IS WEATHER? - What does it mean when it is rainy or sunny? What is snow? Does weather change? What senses do I feel when the weather changes?

B. WHAT MAKES WEATHER? - What are clouds? What happens when water evaporates? What is wind? Do mountains effect the weather?

C. WHAT CAUSES WEATHER? - What is cold air? What is warm air? What is atmospheric pressure? What happens when cold air meets warm air?

UPPER PRIMARY

D. WHAT IS CLIMATE? - How does weather effect the climate? Do different regions have different climates?

E. WHAT CAUSES SEASONS? - What is the earth's axis? Does the distance from the sun effect the climate? Do all places on earth have the same seasons? How does the spinning of the earth affect the weather?

F. WEATHER AND CLIMATE PATTERNS - How do the oceans and land effect weather and climate patterns? What controls the different types of air masses?

WEATHER
KINDERGARTEN - TEACHER SHEET

This sheet only illustrates the characteristics of each of the different type of weather. Point out the following key points:

Rain: comes from clouds; wet liquid; different types of clouds produce different intensities of rain

Snow: comes from cold clouds; solid water, always has a hexagonal shape (an ice crystal grows in this pattern)

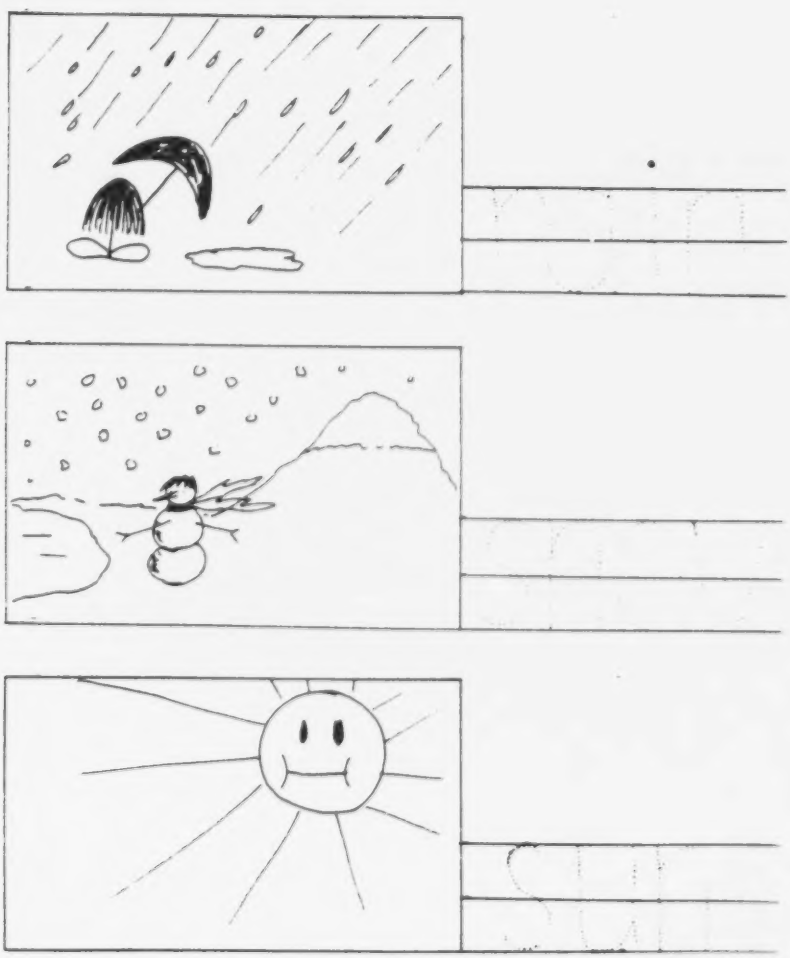
Sun: clear day, depending on where the sun is in the sky controls how hot it is

Although not illustrated on this sheet, discuss other types of weather that your children may encounter.

Hail: Frozen rain (not a crystal like snow)

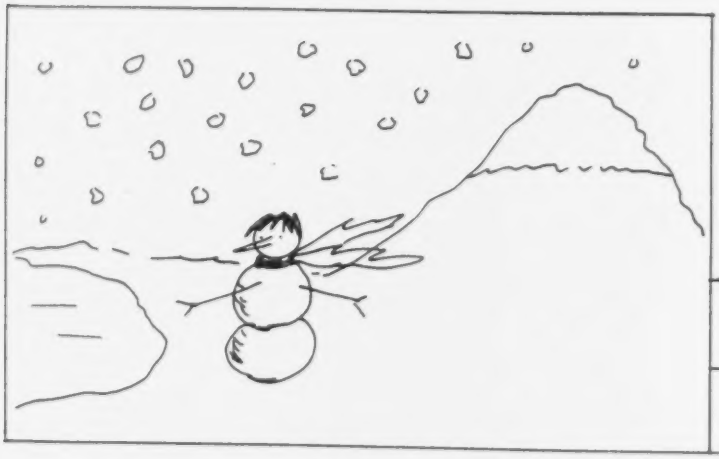
Hurricane: High winds, lots of rain

Tornado: High winds that twirl around violently

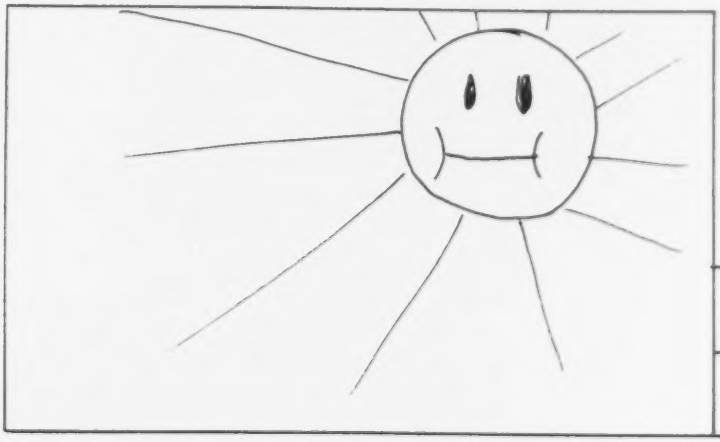


name _____

rain



snow



sun

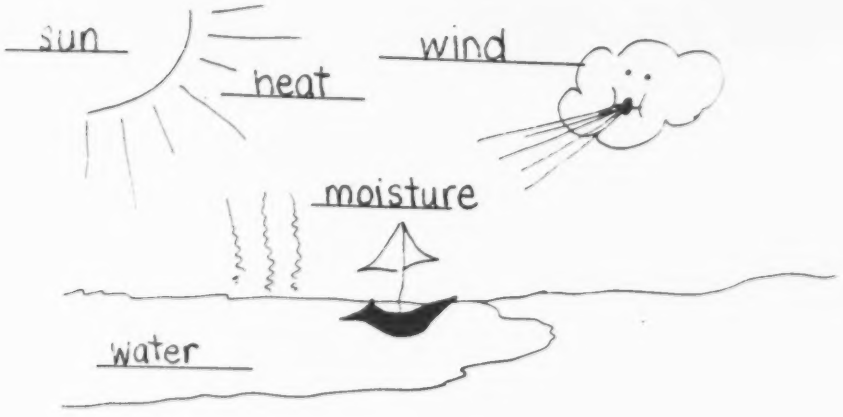
WEATHER
FIRST GRADE - TEACHER SHEET

Weather is dependant on several factors. Some of these factors like the Coriolis Effect (the turning of the earth and how it affects the wind) cannot be understood in the first grade. The main elements: sun, water, moisture, wind and heat, explain most the pieces that make up weather.

The sun mainly heats up the water and land, creates moisture and pressure in a region. This difference in pressures cause the wind to move and when all these elements meet in different forms, they cause different types of weather.

name _____

label the diagram with the correct word

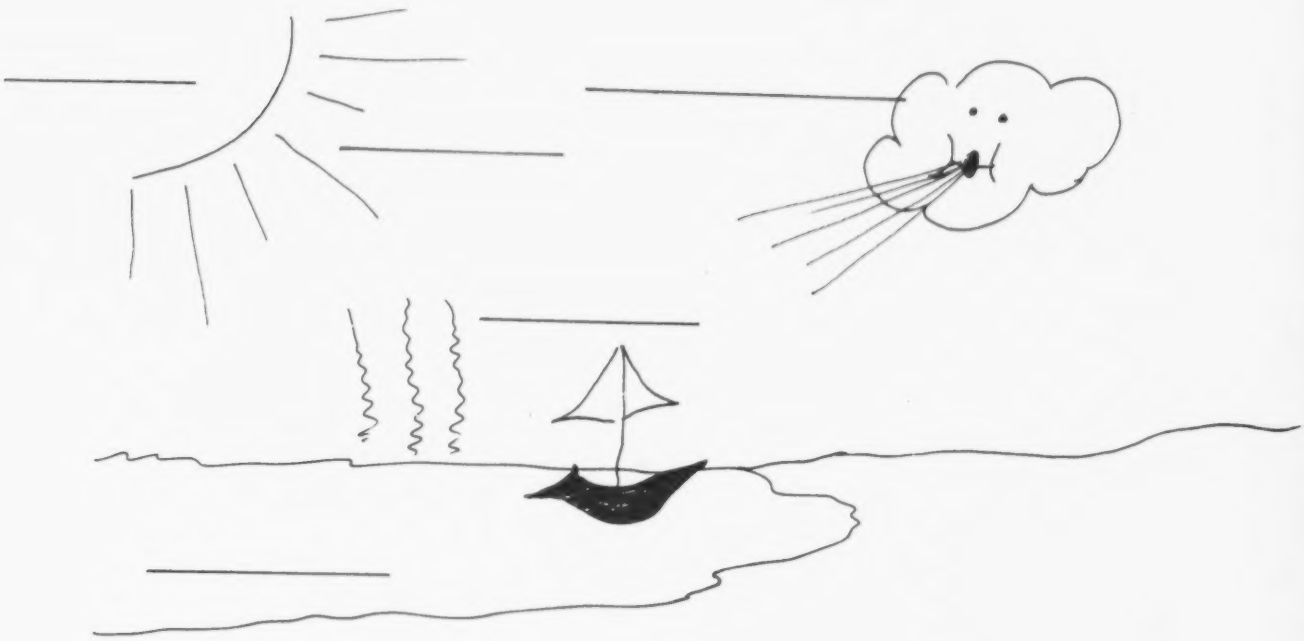


sun
water
moisture

wind
heat

name _____

label the diagram with the correct word

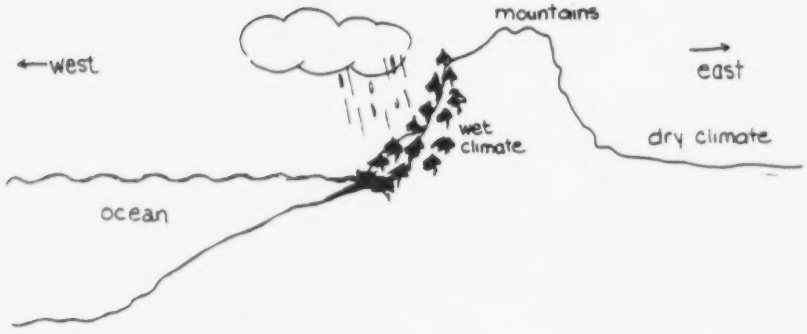


sun
water
moisture
wind
heat

WEATHER
SECOND GRADE - TEACHER SHEET

This exercise illustrates that moisture from the oceans forms clouds that move landward. When the volume of air is lifted to a higher altitude, it becomes colder and more dense than the surround air. This creates a situation which creates rain. Its almost as if, the clouds are too heavy to pass the mountain, so they must release the moisture in the form of rain. This causes the west (in this cartoon) to have trees on that side of the mountain and on the east side of the mountain, dry climate.

name _____



1. Can the clouds pass the high mountains?

no, clouds cannot pass

2. Why is it dry on the east side of the mountain?

clouds with rain do not make it

3 Where are most of the rivers, east or west of the mountain?

west, more wetness

name _____

1. Can the clouds pass the high mountains?

_____

2. Why is it dry on the east side of the mountain?

_____

_____

3. Where are most of the rivers, east or west of the mountain?

_____

_____

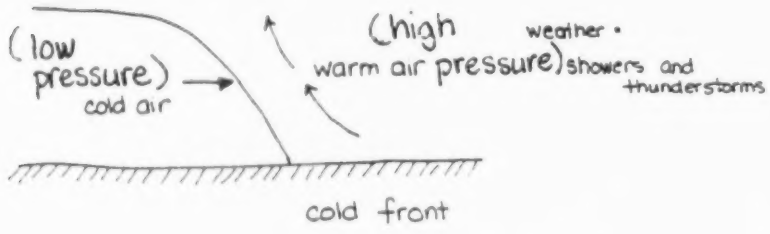
WEATHER
THIRD GRADE - TEACHER SHEET

Atmospheric pressure is the moving force for the weather. Cold air is more dense and it causes what is called low pressure. Warm air which is lighter causes high pressure. Cold air when it is over the oceans will actually depress the sea level in that area; warm air will elevate the sea level.

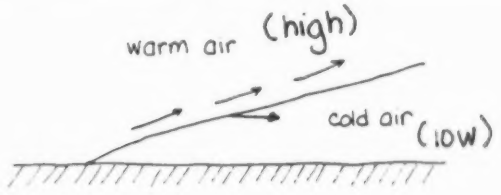
Because cold air is denser and heavier it pushes the warmer, lighter air upward. Depending on how the warmer air is pushed will depend upon how big the "fight" will be. How these different fronts meet cause weather patterns to change. There is many temperatures of "cold" air and "warm" air...causing many weather types.

name _____

low pressure = cold air (dense)
high pressure = warm air (lighter)



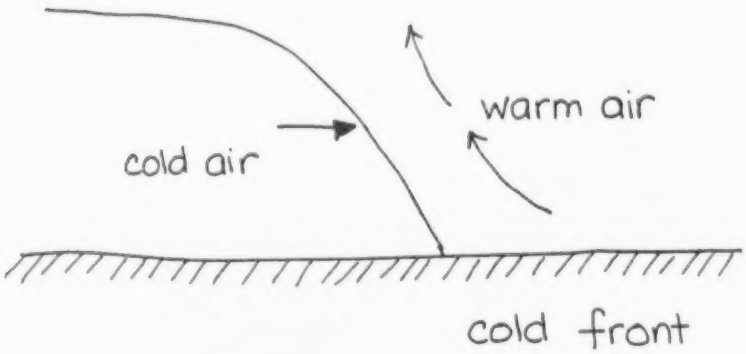
1. color high pressure area blue
color low pressure area red
What type of weather is created? rain



2 color high pressure area blue
color low pressure area red
What type of weather is created? rain

name _____

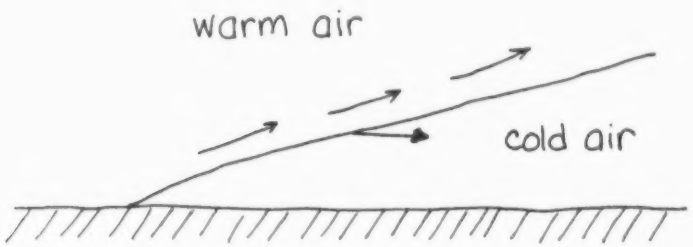
low pressure = cold air (dense)
high pressure = warm air (lighter)



cold front

weather -
showers and thunderstorms

1. color high pressure area blue
color low pressure area red
What type of weather is created?



warm front

weather -
widespread clouds, rain or snow

2. color high pressure area blue
color low pressure area red
What type of weather is created?

WEATHER
FOURTH GRADE - TEACHER SHEET

Climate can be considered the average weather conditions over a long period of time. The climate is influenced by latitude, land and water distribution, altitude, land barrier, air movement, ocean currents, permanent storm areas and high and low pressure centers.

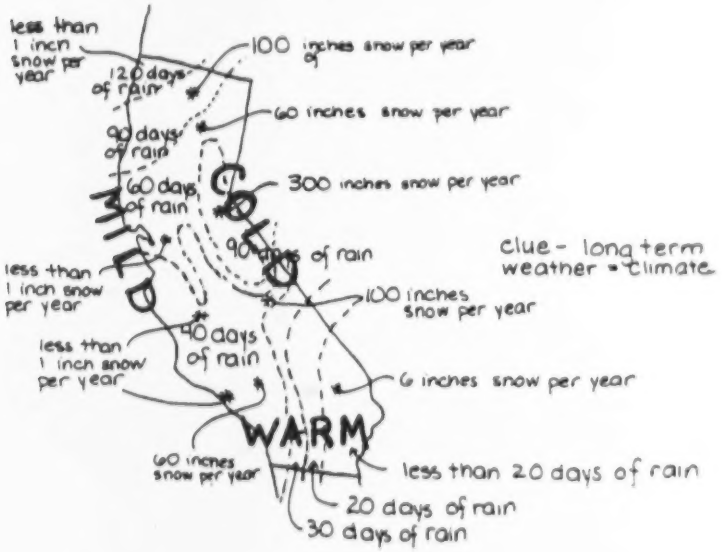
The climate of California can be determined by many of the factors listed above. The main elements that define the climate are:

Coastal: rain, temperature
Mountains: snow, rain, temperature
Southern Desert: lack of rain, dry

This exercise has the students determine the climate by rain and snow. The reasons for our climate is much more involved, but basically California is dependent on the cold Pacific water, elevation, and amount and duration of solar heat.

Other world climates to discuss include: Tropical climates: rainforest, savanna and monsoon. Dry climates: desert and grasslands. Midlatitude climate: humid subtropical, marine west coast, mediterranean, and midlatitude monsoon. Polar climates: tundra and frozen all year round.

Figure the climate of California, using the information given below.

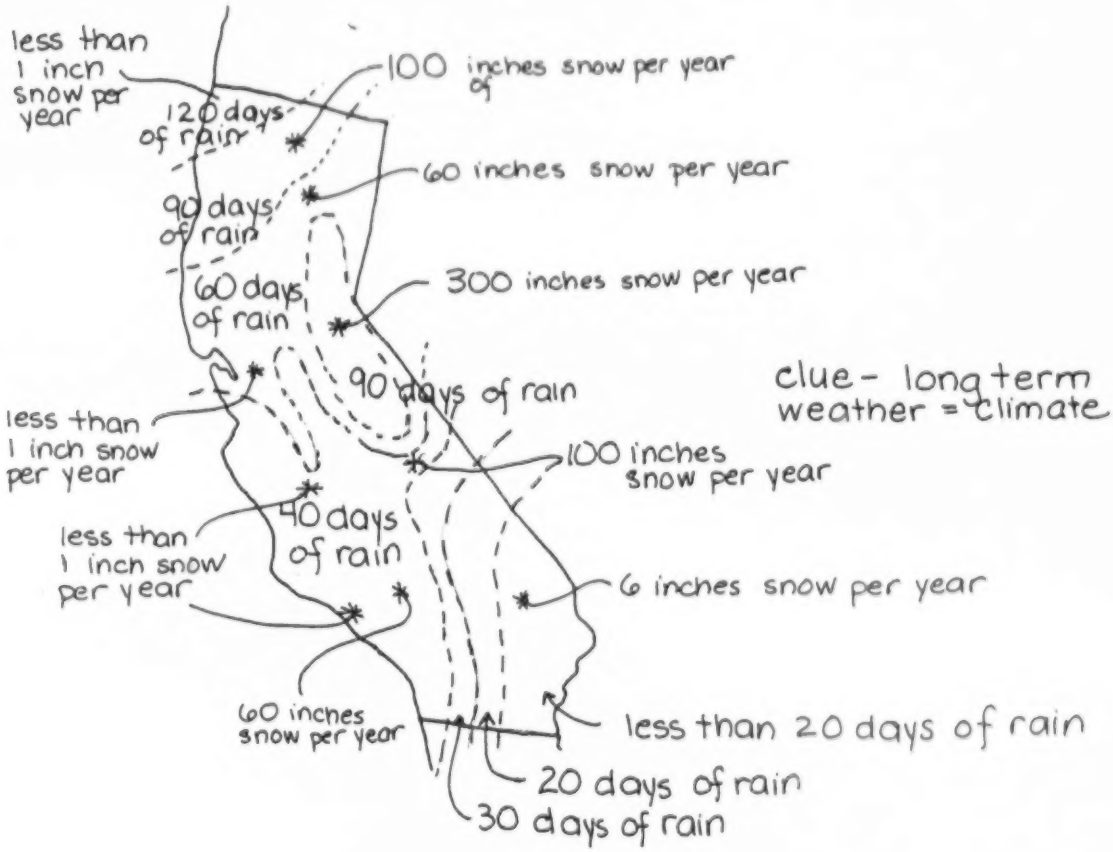

less than 1 inch snow per year
120 days of rain
100 inches snow per year
60 inches snow per year
90 days of rain
60 days of rain
300 inches snow per year
90 days of rain
clue - long term weather = climate
less than 1 inch snow per year
100 inches snow per year
40 days of rain
less than 1 inch snow per year
6 inches snow per year
WARM
60 inches snow per year
less than 20 days of rain
20 days of rain
30 days of rain

color mild climate green
color cold climate blue
color warm climate red

mild climate is rain + little or no snow
cold climate is rain + lots of snow
warm climate is little rain + little snow

name _____

Figure the climate of California, using the information given below.


less than 1 inch snow per year
120 days of rain
100 inches snow per year
60 inches snow per year
90 days of rain
60 days of rain
300 inches snow per year
90 days of rain
clue - long term weather = climate
less than 1 inch snow per year
100 inches snow per year
40 days of rain
less than 1 inch snow per year
6 inches snow per year
60 inches snow per year
less than 20 days of rain
20 days of rain
30 days of rain

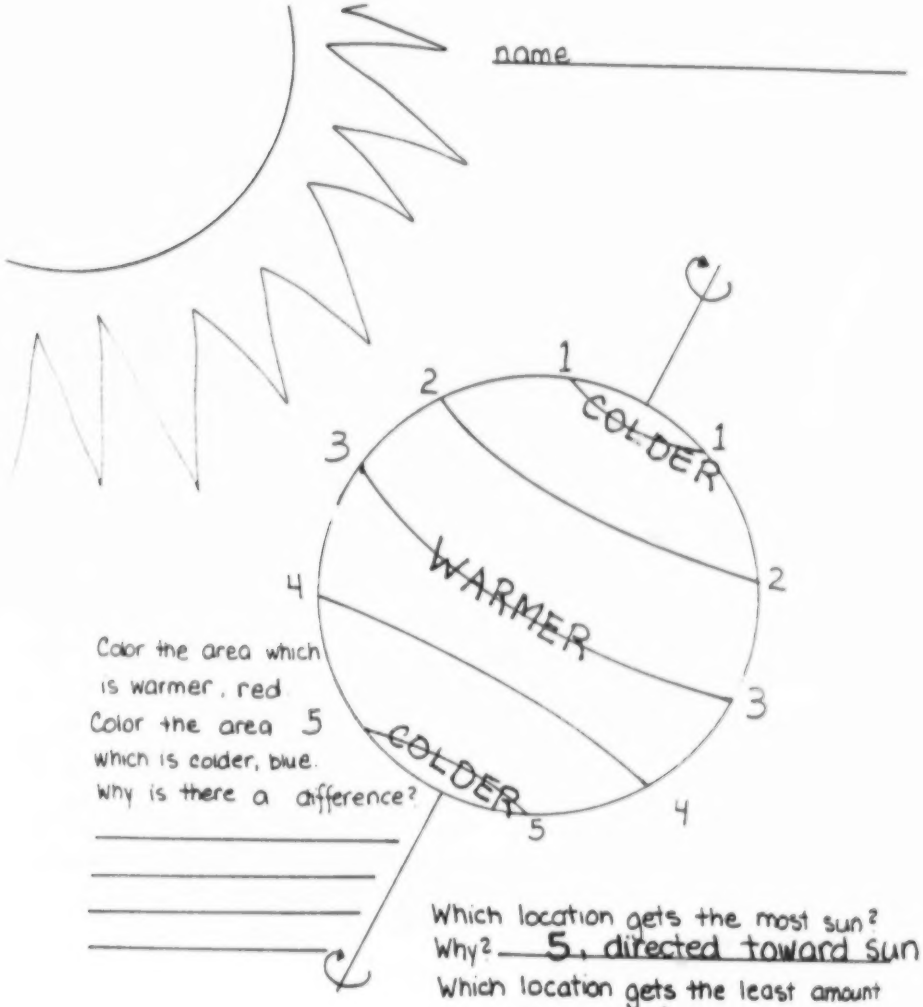
color mild climate green
color cold climate blue
color warm climate red

mild climate is rain + little or no snow
cold climate is rain + lots of snow
warm climate is little rain + little snow

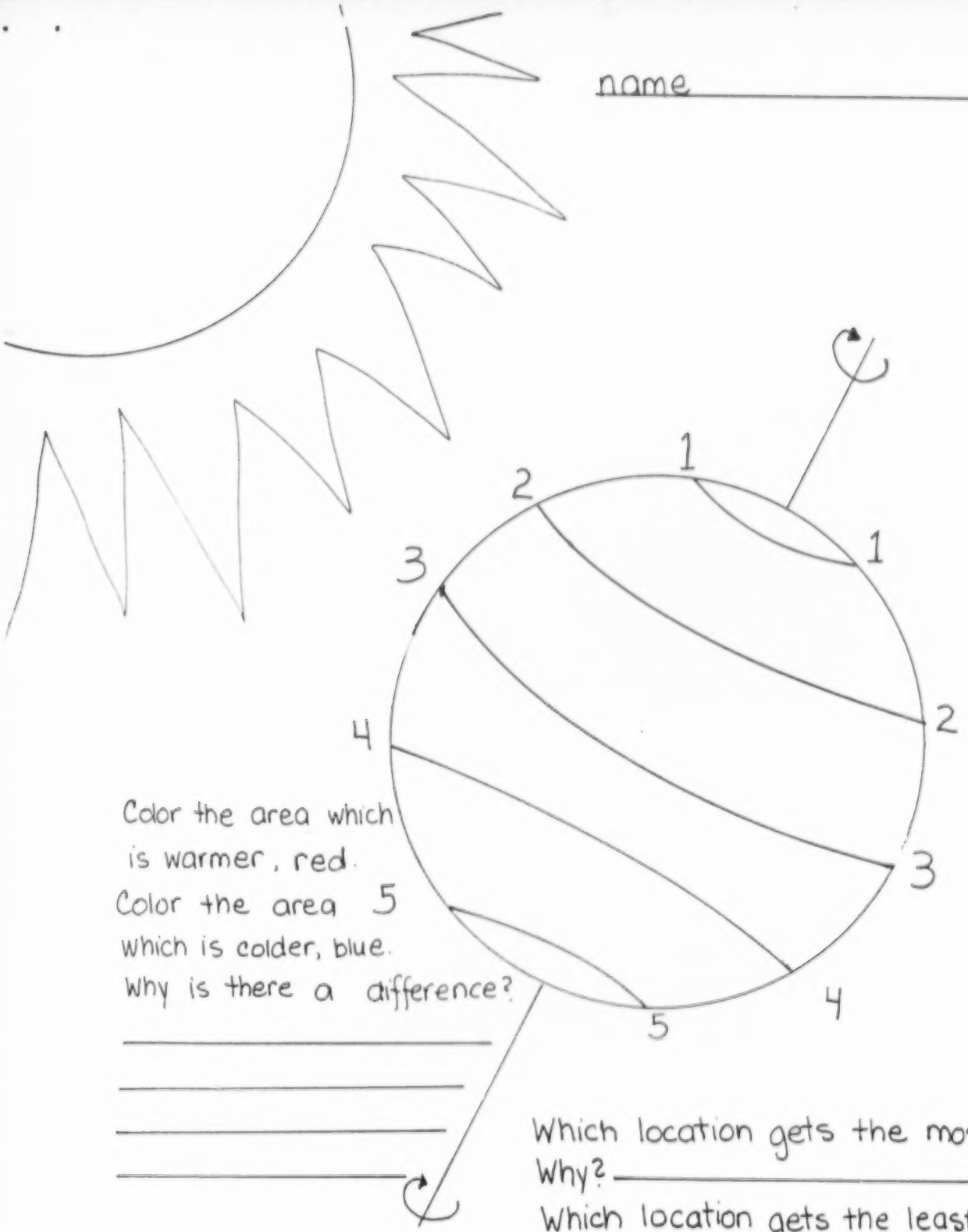
WEATHER
FIFTH GRADE - TEACHER SHEET

This exercise shows the importance of the tilt in the earth's axis on the seasons. It is not as much the quantity of light but the quality of light. It doesn't necessary follow that the area that receives the most sunlight is also the warmest. In this picture area 5 get the most sunlight. However it is at an angle, so the quality isn't the strongest. Along area 3 it gets the most direct light, hence this is the warmest.

Seasons are caused by the annual variation in the angle of the sun's rays and in the length of daylight, which determine the amount of solar radiation absorbed daily by the surface of the earth and the atmosphere.



name _____



Color the area which is warmer, red.
Color the area which is colder, blue.
Why is there a difference?

_____

_____

_____

_____

Which location gets the most sun?
Why? _____

Which location gets the least amount of sun? Why? _____

_____

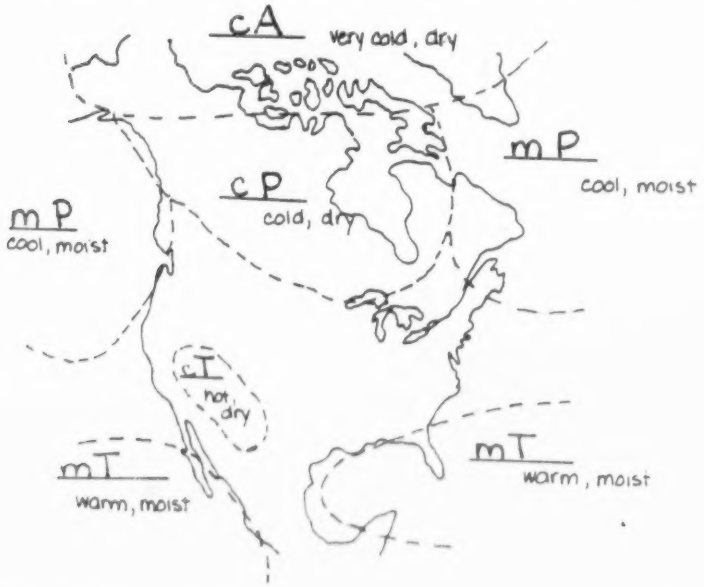
WEATHER
SIXTH GRADE - TEACHER SHEET

The type of air mass over an area is dependant on the (1) latitude or (2) whether it is over a continental or marine area. This exercise is just to familiarize students with the different type of air that we have over the United States.

You may want to refresh their memory that warm air causes a High Pressure area and that cold air causes a Low Pressure area. Generally a High Pressure area moves toward a Low Pressure area, when the two air masses meet, they will form a Front, which will cause a weather change.

name_____

Air masses are named for their source: Tropical (T), Polar (P), Arctic (colder than Polar)(A). Moisture is represented by: continental (c) and maritime (m)

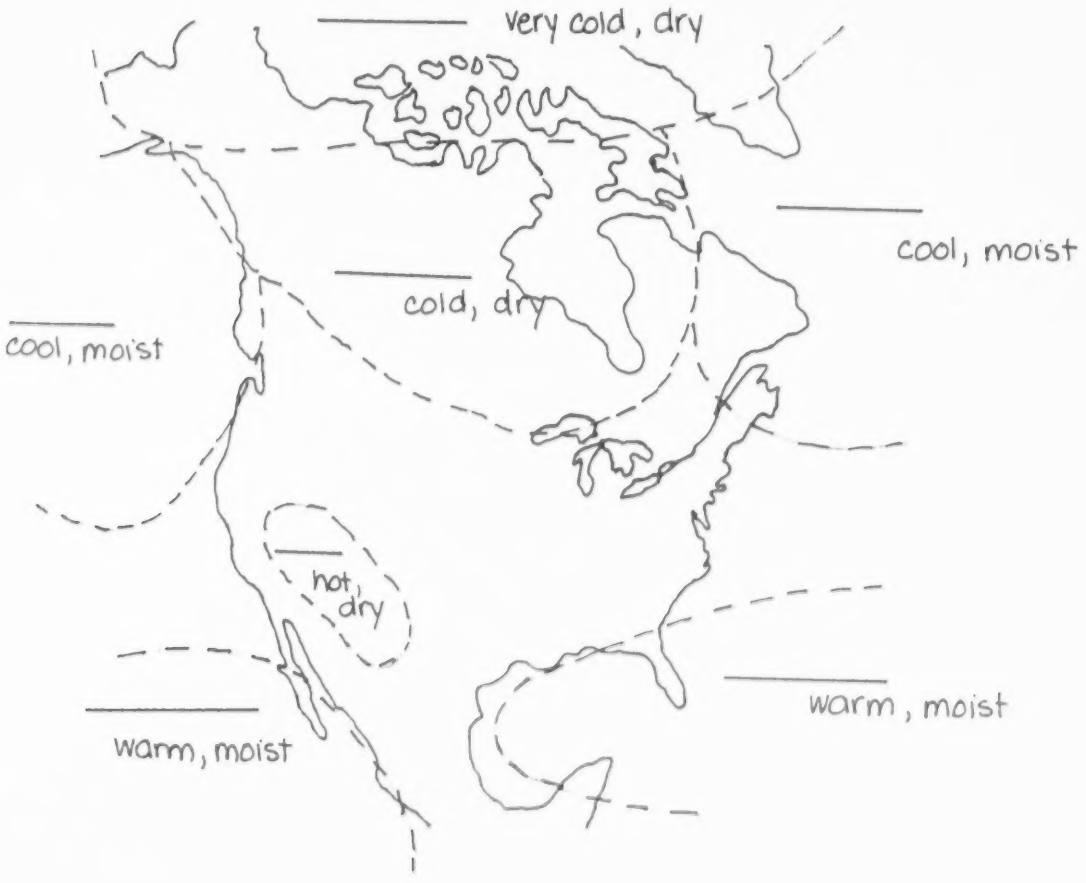


For example air formed over the tropical ocean = mT,
" cold, dry, continental = cP

Label the above map of the United States with its correct symbol. Clues are given.

name _____

Air masses are named for their source: Tropical (T), Polar (P), Arctic (colder than Polar)(A). Moisture is represented by: continental (c) and maritime (m).



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